FURTHER EXPERIENCE OF THE SPECIFIC CURATIVE ACTION IN AMOEBIC DISEASE OF HYPODERMIC INJECTIONS OF SOLUBLE SALTS OF EMETINE.

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IN the BRITISH MEDICAL JOURNAL of June 22nd* last I recorded cases illustrative of acute and chronic amoebic dysentery and acute hepatitis respectively in patients who were unable to take ipecacuanha by the mouth, but were rapidly cured by subcutaneous injections of soluble salts of emetine, without the production of vomiting or marked nausea, which are such serious drawbacks to the use of full doses of ipecacuanha by the mouth. During the two months which have elapsed since that note was written I have had frequent opportunities of using the new treatment in suitable cases, thanks mainly to the kindness of my I.M.S. colleagues in the different Calcutta hospitals, to whom I tender my best thanks. The results have been more than confirmatory of my first very favourable impressions, and leave no possible doubt as to the great practical importance of the discovery. Some of them are, indeed, so surprising that they must be seen to be fully appreciated, as words can convey but a feeble impression of the rapidity and completeness of the recoveries effected in very grave cases. In dealing with the more extensive material now available it will be well to classify the cases into different clinical groups.

I.—*Extremely Acute Amoebic Dysentery with Marked Thickening and Tenderness of the Bowel and High Leucocytosis.*

The most serious form of amoebic dysentery is a primary attack, or an acute exacerbation of a chronic one, in which parts of the large bowel can be felt through the abdominal wall as very tender, greatly thickened, rounded or sausage-shaped masses, showing that the whole thickness of the gut is involved, including the peritoneal coat, and nearly always accompanied by an extreme leucocytosis of from 30,000 to 50,000 per cubic millimetre. The prognosis in these cases is exceedingly grave, as gangrene, perforative peritonitis, or post colic abscess are frequent fatal complications. I find I have earlier notes of 13 such cases with leucocyte counts of from 25,000 to 49,250, 7 of which proved fatal within a few days, 4 were taken away in a dying condition by their relatives, and only 2, or 15 per cent. recovered, in spite of ipecacuanha having been given in quantities of 30 to 60 grains or more a day. The fact is that sufficient ipecacuanha cannot be administered quickly enough by the mouth to save more than a very small percentage of such cases. The following are examples of this class treated by emetine salts hypodermically.

CASE I.

Native male, aged 30, admitted to my ward for cholera with a history of having passed fifteen stools in the last twelve hours, the last containing blood. Specific gravity of blood 1059, blood pressure 112. On examining the stools no cholera organisms were found either microscopically or on culture, but very numerous small amoebae were present. The abdomen was distended and the caecum could be felt as a greatly thickened mass, extending into the hypogastrium and very tender to the touch, while the sigmoid showed less marked, but similar, changes. He gave a history of three previous attacks of dysentery, the last being one month ago. Hypodermic injections of emetine hydrobromide were at once begun, and the progress of the case, together with the leucocyte counts, can be seen at a glance at the accompanying table.

	First Day.	Second Day.	Third Day.	Fourth Day.
Number of stools—				
Day	9	3	2	1
Night	1	2	1	1
Emetine hydrobromide	1 gr.	1½ gr.	1 gr.	Ip. 40 gr.
Mucus	Much	*Nil*	*Nil*	*Nil*
Blood	Much	*Nil*	*Nil*	*Nil*
Amoebae	Numerous	*Nil*	—	—
Leucocytes	30,050	22,500	12,250	9,250
Ratio to red	1 to 206	1 to 308	1 to 409	1 to 651
Polynuclears	90.8	84.4	72.4	52.8

The blood and mucus and the amoebae had disappeared from the stools in twenty-four hours, and by the fourth day the whole of the thickening and tenderness of the caecum and sigmoid, as well as the leucocytosis, had vanished, and the patient was convalescent. Further progress was uneventful, and he was discharged cured eleven days after his admission.

CASE II.

Native male, aged 24, admitted to my ward for cholera in the collapse stage at 7 p.m. with a specific gravity of 1064 and a blood pressure of only 50 mm. He was given four pints of hypertonic saline intravenously on admission, and required two subcutaneous ones of one pint each during the night. On the following morning he had recovered well from the collapse, but the stools showed thick blood and mucus, and microscopically very numerous young amoebae were present, together with cholera vibrios, the latter being obtained in pure culture, proving a mixed infection to be present. The descending colon and sigmoid flexure were greatly thickened and tender. At 1 p.m. he passed a stool containing a number of black shreddy sloughs, such as Ewart found to be a sure sign of fatal gangrenous dysentery, together with some white ones containing amoebae. Emetine treatment was at once begun, with the result shown in the following table:

	First Day.	Second Day.	Third Day.	Fourth Day.	Fifth Day.
Number of stools—					
Day	—	9	4	3	1
Night	15	0	2	3	0
Emetine HBr	*Nil*	1½ gr.	1 gr.	1 gr.	Ip. 40 gr.
Mucus	Choleraic	Much	*Nil*	*Nil*	*Nil*
Blood	Choleraic	Much	*Nil*	*Nil*	*Nil*
Amoebae	—	Numerous	*Nil*	—	—
Leucocytes	—	32,500	12,000	—	8,750
Ratio to red	—	1 to 171	1 to 457	—	1 to 538
Polynuclears	—	89.8	73.2	—	63.8

By the fourth day all tenderness and thickening of the large bowel, as well as the leucocytosis, had disappeared, and the patient was convalescent, being discharged cured at the end of seven days in hospital, and was seen two weeks later quite free from all dysenteric symptoms. He had thus been cured of sloughing amoebic dysentery coincident with a fairly severe attack of cholera.

Cases I and II are very good examples of the acutest form of amoebic dysentery in which the disease was cut short, and both great thickening of the bowel and an extreme degree of leucocytosis cleared up within three or four days, very great improvement having been apparent within twenty-four to forty-eight hours, under treatment with from 1 to 1½ grains of emetine hydrobromide daily, an equivalent of 90 to 135 grains of ipecacuanha. The chances of the recovery of either of them under ipecacuanha treatment by the mouth would have been very small. In the next case, although emetine failed to save the patient's life, yet even more convincing evidence of the specific action of the drug was obtained.

CASE III.—*Fatal Gangrenous Amoebic Dysentery, in which the Amoebic Infection was Destroyed within Sixty Hours by Emetine Injections.*

Native male, aged 45, and a confirmed opium eater, taking about 30 grains a day, admitted for dysentery of twelve days' duration, having had another attack a month before. Passing about twenty very foul stools a day with blood and mucus containing numerous amoebae. Abdomen somewhat distended and marked thickening and acute tenderness of the large bowel from the caecum to the splenic flexure, but most marked in the right iliac fossa, and a high degree of leucocytosis. Progress:

	First Day.	Second Day.	Third Day.
Number of stools—			
Day	4	11	2
Night	15	4	—
Emetine hydrobromide	1½ gr.	2 gr.	*Nil*
Mucus	Much	Less	Trace
Blood	Much	Less	*Nil*
Amoebae	Numerous	Numerous	*Nil*
Leucocytes	22,250	16,000	14,250
Ratio to red	1 to 268	—	—
Polynuclears	88.4	81.6	82.0

* In the former paper, for "Docker, I.M.S.," read "Docker, A.M.S."

Three ½-grain doses of emetine were given the first day and he appeared to be rather better in the evening. The next morning he was passing more frequent stools again, so two 1-grain doses were given hypodermically, each equal to 90 grains of ipecacuanha, without any apparent depression and no nausea or vomiting. The washings of the stools of the first twenty-four hours showed a cupful of large raw-meat-like sloughs, and those of the second twenty-four hours were similar, but smaller and less blood-stained. The second night, after the two 1-grain doses of emetine, he had only four small stools containing a very little thin mucus faintly streaked with blood, while the morning stool was watery brown faecal, with only a minute trace of white mucus and quite free from amoebae. In spite, however, of large doses of opium, he had been unable to get any sleep, and suffered much from the great restlessness of opium eaters, being worn-out, cold, and clammy. The tenderness and thickening of the large bowel had disappeared except in the right iliac fossa, where they were as marked as before, so I recognized that local peritonitis, with either a post-caecal abscess or gangrene, must be present, for which nothing more could be done, and he died on the evening of the same day. A *post-mortem* examination was obtained, which revealed most extensive amoebic ulceration affecting the whole length of the large intestine, although the rectum was but slightly involved. The caput coli was gangrenous, with little but the peritoneal coat remaining, while inflammatory recent lymph on the surface bound it loosely to the ileum. A prolonged microscopical examination of scrapings of the ulcers in various parts of the bowel failed to reveal a single living amoeba, and sections through the walls of some of the more recent ulcers stained with haematoxylin showed not a single parasite, although they are ordinarily quite easily demonstrated by either of these methods. Thus, in spite of the terrible acuteness and extent of the lesions, every single amoeba appears to have been killed by the 3½ grains of emetine injected subcutaneously during the two and a half days he was in hospital, and thus the failure to save this opium-eating patient furnished the most conclusive evidence of the specific nature of the new method of treatment, and fully explained the apparently miraculous recoveries recorded in Cases I and II.

II.—*Moderately Acute Amoebic Dysentery Rapidly Cured by Emetine.*

Case IV and V are typical of acute amoebic dysentery, such as usually yield to full doses of ipecacuanha in time, but which are much more rapidly and certainly cured by the new treatment, and with far less suffering to the patient. For this common class the new method will be a great boon.

CASE IV.

A native female, aged 28, admitted for acute dysentery of fifteen days' duration and passing such numerous stools of pure blood and mucus that the bed-pan had to be kept constantly by her. Tenderness and thickening of the caecum extending into the hypogastrium, and restlessness were present. Numerous amoebae were found in the stools. After three days' treatment with ipecacuanha by the mouth the symptoms and great frequency of the stools and local signs remained the same, and I was asked to treat her with emetine. Two ½-grain doses were given the first day, and the next morning the stools were much less frequent and contained faecal matter, while her general condition had much improved. Two more ½-grain doses were given that day, and during the following night, that is from thirty-six to forty-eight hours after the first dose, not a single stool was passed, nor did she have any more dysenteric motions during the subsequent eight days before she was discharged cured. The thickening and tenderness of the caecum also rapidly disappeared.

CASE V.

A native male, aged 30, admitted for acute dysentery of fifteen days' duration, with pain in the abdomen, but no marked thickening of the bowel, and passing ten to twelve stools of blood and mucus daily, containing numerous active amoebae. After two days' treatment with ipecacuanha in 25-grain doses no improvement was apparent and the stools contained much blood, so emetine was injected in ½-grain doses twice daily for three days. By the end of that time the stools had been reduced to four soft yellow faecal ones a day, with no blood or mucus and free from amoebae, while the abdominal pain had disappeared. The leucocytes had also fallen from 12,750 to 6,250, and steady convalescence ensued.

III.—*Chronic Amoebic Dysentery Rapidly Cured by Emetine.*

The patient with dysentery of three and a half years' duration, recorded in my first paper as rapidly cured by emetine, has continued free from all dysenteric symptoms. One further case belonging to this class may here be mentioned.

CASE VI.—*Chronic Amoebic Dysentery of Six Months' Duration Rapidly Cured by Emetine.*

A Eurasian, aged 25, was admitted to my ward with a history of having passed four or five stools, containing blood and mucus, daily for six months. He had slight tenderness over the caecum, but no thickening could be felt. Leucocytes 12,000 per c.mm. Stools of pure blood and mucus were being passed, containing very numerous active amoebae, as many as six or eight being seen in some fields of the microscope. Half a grain of emetine was injected once a day for three days, after which ipecacuanha 20 grains was given every evening. Twenty-four hours after the first dose of emetine the stools were free from blood or mucus and no amaebae could be found. No further signs of dysentery ensued during the seven days he was in hospital, and I saw him three weeks later, when he was still keeping quite well.

IV.—*Acute Hepatitis Threatening Liver Abscess Formation Cured by Emetine.*

The remarkable effects of ipecacuanha in preventing liver abscess by curing both acute and chronic hepatitis, which was demonstrated by me in 1907, has been repeatedly confirmed by other workers, including a recent paper in the *Journal of the London School of Tropical Medicine*. In my first note on the emetine treatment I recorded an example of the rapid action of the new method in a patient who could not take ipecacuanha by the mouth, and two further cases are now added.

CASE VII.

A native male, aged 17, admitted with very acute hepatitis with marked enlargement and extreme tenderness of the lower border of the liver. An evening rise of temperature to 101° F. had persisted for ten days, in spite of 30 grains of ipecacuanha daily during the last four evenings. Two ½-grain injections of emetine were now given, and within eight hours of the first dose the tenderness had remarkably decreased, and on the following day the temperature became normal and remained so for four days. It then rose again in the evenings, and *x* rays showed a shadow suggestive of liver abscess. A needle was passed into the lower part of the right pleura and a little purulent lymph was drawn off. Ipecacuanha was persisted with and the condition cleared up entirely without any further operative procedures being necessary. The beneficial effect of a single grain of emetine in the early acute stage of this case was very striking.

CASE VIII.

A European male, aged 29, was admitted for acute hepatitis with intermittent fever, and 20-grain doses of ipecacuanha were given every evening. As the fever and hepatic pain persisted for five days the liver was explored for pus under an anaesthetic, but with a negative result. Emetine hydrobromide was now injected daily in ½-grain doses, and the temperature at once fell to normal and the pain subsided. Ipecacuanha was reverted to after four days, but the improvement was less marked than under the emetine, so the daily ½-grain dose of the latter was recommenced, and at once rapid improvement set in, going on to complete convalescence after a few doses, and accompanied by a fall in the previously high leucocyte count.

V.—*Amoebic Abscesses of the Liver and Spleen Cured by Aspiration and Emetine Injections.*

As early as 1902 I showed that unopened amoebic abscesses of the liver are, in the great majority of cases, sterile as regards bacteria, and therefore suggested removing the pus by aspiration, and injecting soluble salts of quinine into the cavity to kill the amoebae in the wall of the abscess, in the place of the exhausting open operation with prolonged drainage. Later, I advised in addition the continued administration of full doses of ipecacuanha after any form of operation on such abscesses. This method is being used with increasing success in Calcutta at the present time, although it fails in some cases. The proof afforded in my recent paper that soluble salts of emetine rapidly kill the amoeba of dysentery when used in much higher dilutions than the quinine salts, clearly indicates the former drug as the more efficient one for the purpose just mentioned. Moreover, the evidence above recorded in this paper, to show that emetine can be given in sufficient doses to kill off rapidly all the amoebae in the greatly thickened wall of the large bowel in acute dysentery, made it highly probable that it would act equally well on the parasites in the walls of amoebic abscesses of the liver. The following remarkable case will show that this is actually the case.

CASE IX.—*Acute Amoebic Dysentery with Multiple Liver Abscesses, in which all the Amoebae in the Latter were Killed by Subcutaneous Injections of Emetine.*

A native male, aged 30, was admitted in a very low state for severe dysentery of two months' duration. I examined the stools and failed to find any amoebae, but as he was not improving ½-grain doses of emetine were injected twice on two consecutive days, making a total of 2 grains in all. The dysenteric stools decreased in number and much improved in character, but he remained in a low condition, and died twenty-six hours after the last injection. At the *post-mortem*

examination I found extensive ulcers of the amoebic type throughout the large bowel, but, with the exception of one extensive sloughing one in the caecum, their bases were clean and smooth and their edges overhanging, as if they had recently lost the usual tawny yellow gelatinous infiltration. The cause of death was found to be very numerous small recent amoebic abscesses of the liver from ¼ in. to 2 in. in diameter, scarcely a square inch of the cut surfaces being free from them. The pus from several of them proved sterile as regards bacteria on culture. I spent a long time examining scrapings from the walls of a number of the abscesses, but failed to find a single living amoeba, although in similar cases I had always been able to detect them with the greatest ease. On adding to the pus a little watery methyl-blue a few unstained granular degenerate amoeba-like cells were found, similar to amoebae which have been subjected for a short time to the action of a very dilute solution of emetine. These observations left no doubt in my mind that every amoeba in the liver had been killed by the emetine injected subcutaneously during life, as the body was fresh and the temperature very favourable for the preservation of the parasites. Moreover, sections of the walls of some of the smaller abscesses stained with haematoxylin also showed no amoebae, although they are readily demonstrated in this way when emetine has not been used in the treatment.

This case, taken with No. III above recorded, appear to me to afford strong evidence that emetine salts administered hypodermically in sufficient doses will kill all the amoebae in both the intestinal and liver abscess walls, and thus explains the extraordinary results recorded in this and my former paper, and affords good hope of even more uniform success in the treatment of the deadly and widespread amoebic infections when the new method is fully worked out and the most useful and safe doses ascertained. The following cases will serve to prove that emetine is also of great value in the treatment of amoebic abscesses of the liver and spleen, and is likely in the near future to save a large proportion of these unfortunate patients from the surgeon's knife.

CASE X.—*Epigastric Liver Abscess Cured by Aspiration and Emetine Injections after Failure of the Quinine Treatment.*

A native lad, aged 15, admitted for a liver abscess bulging in the epigastric region. Six ounces of liver pus were removed by aspiration, and 1 oz. of saline containing 10 grains of the soluble bihydrochloride of quinine injected into the cavity, and the puncture sealed with collodion. Intermittent fever continued and the abscess cavity refilled within four days. A second aspiration was now done, 8 oz. of liver pus being removed, and 1 grain of emetine hyrobromide, dissolved in 2 oz. of sterile salt solution, was injected into the cavity. The emetine salt was also injected subcutaneously in ½-grain doses every morning for four days, and again on the sixth day. In addition, 10 grains of ipecacuanha were given by the mouth every evening. After two days the temperature fell to normal and never again rose above 99° F. The abscess cavity steadily contracted and the tissues became firm, and he was discharged cured just under one month after the emetine injection, having been detained under observation to make sure that the abscess did not refill. This case is one which would, in all probability, have done well by the open operation, as the abscess was a comparatively small one, but the rapid subsidence of the fever, and cessation of formation of pus under the influence of emetine was very striking.

CASE XI.—*Right Lobe Liver Abscess Cured by Aspiration and Injection of Emetine.*

A native male, aged 30, admitted for liver abscess following dysentery six months before. On aspirating through a lower right intercostal space, 8 oz. of typical liver abscess pus were withdrawn and 1 grain of emetine hydrobromide dissolved in 2 oz. of sterile salt solution injected into the cavity and the puncture wound sealed with collodion. Half-grain doses of emetine were injected subcutaneously on each of the four following mornings and 25 grains of ipecacuanha given in the evenings, my supply of emetine being then very limited. The temperature rapidly fell to normal, but on three occasions during the next thirteen days it reached 100° F. in the evening. At the end of this time the liver was normal in size and there were no signs of further collection of pus, but to make quite sure a second exploration under an anaesthetic was now performed, with a negative result, and subsequent convalescence was only interrupted by a mild attack of benign tertian malaria.

In addition to the above cases, a third, very similar to No. XI, has done equally well, but it is yet too early to be certain of his permanent cure. On the other hand, in two others the pus obtained at the time of aspiration and injection of emetine was found on culture to contain large numbers of staphylococci, and consequently the abscesses had to be opened and drained, with ultimate recovery. I have previously pointed out, in connexion with my method of treating amoebic liver abscesses by aspiration and injection into the cavities of soluble quinine salts, that such a plan should only be persisted with if the pus is free from marked secondary bacterial infection, as is the case in 85 per cent. in my experience.

Amoebic Liver Abscesses Cured by Aspiration and Subcutaneous Injections of Emetine.

In two other cases, one of which is still under observation, liver abscess pus was evacuated by aspiration and emetine injected subcutaneously, but not into the abscess cavity. In one the emetine injections were given for acute hepatitis, which greatly improved, but, as leucocytosis persisted, the liver was explored and several ounces of pus withdrawn, after which steady convalescence ensued and the leucocytosis disappeared. In the other the emetine injections were commenced two days after the aspiration of liver pus, with an equally happy result. A single aspiration so exceptionally cures such cases that these two successive recoveries are in all probability due to the action of the subcutaneous injections of emetine in destroying the amoebae in the walls of the liver abscesses, so it may eventually prove unnecessary to inject the drug into the cavities; although in view of the harmlessness of the procedure, and the certainty that it will kill the parasites in the superficial parts of the lining membrane, it is advisable to do so in the present state of our knowledge.

CASE XII.—*Amoebic Abscess of the Spleen Cured by Aspiration and Emetine Injections.*

A native male, aged 32, admitted with enlargement of the spleen to 2 in. below the left costal margin and a tender prominence of the lower ribs, with redness of the skin over it. On exploration 8 oz. of thick reddish pus and blood, closely resembling that of amoebic liver abscesses, were withdrawn. Three days later there was evidence of refilling of the cavity, so a second aspiration of 4 oz. was performed, and this time 1 grain of emetine hydrobromide in 2 oz. of water was injected. I examined the pus microscopically, and found amoebae to be present, while it was sterile on culture for bacteria. On each of the next two days half a grain of emetine was injected subcutaneously, but the temperature once more rose, and six days after the second aspiration there was again slight bulging. A third aspiration was now done, but only a little pus and much blood was obtained, and a grain of emetine hydrobromide was again injected into the cavity, and two more ½-grain doses given subcutaneously. The temperature finally fell to normal two days later, and the abscess did not again refill, but complete recovery ensued.

This case is of great interest, both on account of the rarity of amoebic abscess of the spleen and because of its successful treatment by the new method; for when opened they are liable to heal very slowly and to leave obstinate sinuses. It was for this reason that a repetition of the emetine injection into the cavity was carried out, with the fortunate results recorded.

Taken as a whole, the cases above detailed of amoebic abscesses of the liver and spleen treated by emetine injections are full of promise. If further experience should confirm them a new era will be commenced in the treatment of this very serious and fatal disease, for the causative parasite can be destroyed by injections of emetine salts into the abscess cavities, after very thorough evacuation of their contents by aspiration, and subcutaneous injections of the same drug will kill the organisms in the deeper layers of the abscess wall through the blood stream (as well as in any latent amoebic ulcers in the large bowel which may have produced the liver trouble), and thus the necessity of resorting to the much more serious and exhausting open operation and prolonged drainage, with the almost inevitable secondary bacterial infection of the wound in damp hot climates, may be largely done away with, greatly to the comfort and benefit of the patients.

The Disappearance of Leucocytosis as Evidence of the Cure of an Amoebic Abscess of the Liver.

When using the above method it is often difficult to decide if the abscess is completely cured, or if some pus has again accumulated, necessitating a further aspiration. Here leucocyte counts are of great value, for I have frequently found that if an original actual or relative leucocytosis has not disappeared within about a fortnight after an aspiration, pus will usually be again found on exploring; while if the original increase in the white corpuscles has vanished, the abscess is really cured, and further aspirations are negative, although usually harmless.

Dosage.

Either the hydrochloride or the hydrobromide of emetine are equally useful, the former being the more soluble, while the latter requires about 2 c.cm. of sterile water or saline to dissolve it. At first I chiefly used ½-grain

doses, but now very seldom employ less than half a grain at a time, and often give as much as two-thirds, the equivalent of 60 grains of ipecacuanha, and have twice injected 1-grain doses subcutaneously without any vomiting or depression, but such a quantity is only required in extremely acute amoebic dysentery. The salts can be safely boiled for a very short time, but it is better to dissolve them in sterile saline, or to boil the solution first and then add the emetine salt. I have arranged with Messrs. Burroughs and Wellcome to put up the drugs, both as tabloids and already dissolved in sealed ampoules, while Messrs. Parke, Davis are also supplying them in the latter form.

The Value of Emetine Treatment in the Differential Diagnosis of Amoebic from other Varieties of Dysentery.

The extraordinary rapidity with which very marked improvement follows the subcutaneous injections of ½-grain doses of emetine is of the greatest diagnostic importance, for cases of bacillary dysentery and other non-amoebic causes of the presence of blood and mucus in the stools are not, in my present experience, materially affected by the drug, although it has done no harm in them. Thus, in a case of chronic bacillary dysentery complicating kala-azar, emetine injections had no effect, and the disease steadily progressed to a fatal termination. Again, I was asked to treat with emetine a case of suspected amoebic dysentery with six to seven stools of blood and mucus daily. On examination the patient pointed to the caecal region as the seat of pain, and clinically I also thought the case to be probably amoebic, so injected ½-grain doses of emetine hydrobromide daily for three days, without the slightest effect on the number or character of the stools. I twice examined the stools for amoebae, with negative results, while cultures failed to separate any bacilli which would clump with either Shiga or Flexner serum. The rectum was then examined, and cancer detected high up. The failure of adequate subcutaneous doses of emetine to produce marked improvement within two or three days is, then, very strong evidence that the disease is not of amoebic origin. This specific action of emetine salts in amoebic disease alone is of the greatest interest and importance. Ever since I was the first to recognize the frequent occurrence of amoebic dysentery in India and to demonstrate that living amoebae are always present in scrapings of the walls of large tropical liver abscesses, I have never doubted the pathogenic action of these parasites. In my experience, whenever active amoebae of the *histolytica* type, including the variety described by Noc and shown by Grieg to be the common one in India, have been found in dysenteric stools (and I have almost invariably found this form only), the disease has eventually proved amenable to full doses of ipecacuanha, if not too acute or far advanced. Still, facilities and time for the microscopic examination of the stools of the large number of dysentery cases which often have to be dealt with in the tropics, are seldom available, so a simple and harmless clinical method of differentiating amoebic from other forms, such as is now furnished by the emetine treatment, is clearly of the greatest practical importance, and will also lead to the early adoption of suitable treatment in those cases, which prove not to be amoebic in nature. Moreover, it will allow of more rapid advances in our knowledge of the distribution of the two great classes of dysenteries than can be furnished by the very limited number of workers available for bacteriological researches on this subject in the tropics. We may, perhaps, also hope to hear no more doubts as to the existence of amoebic dysentery as a separate entity, such as were expressed in a recent editorial in a leading Indian medical journal.

Conclusion.

We have, then, in my method of the subcutaneous injection of soluble salts of emetine a specific treatment of amoebic hepatitis and amoebic dysentery, which is so rapidly beneficial in the latter as to be also of great diagnostic value between that and other causes of the passage of blood and mucus in the stools. Yet, strange to say, this remarkable remedy—probably the most active specific in the whole range of medicine, not excluding quinine and salvarsan—has for long been thrown away by those who pinned their faith in ipecacuanha sine emetina.

GRANULE-SHEDDING IN TRYPANOSOMA GAMBIENSE.

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THE "infective granule" in trypanosomiasis has been described by Major W. B. Fry, R.A.M.C.[1] Major Fry kindly demonstrated to me the presence of these bodies in experimental trypanosomiasis in animals, and I have continued investigations on similar lines here. As I am unaware of observations having been made on the "granule" of *Trypanosoma gambiense* in human trypanosomiasis, the following notes may be of interest.

Blood and gland puncture wet preparations from cases of sleeping sickness have been examined by the dark ground method, and the results confirmed by vital staining.

"Granules" are present in the trypanosomes—usually three or four in number. They are small, circular, highly refractile bodies, obviously within the trypanosome, and constantly swinging backwards and forwards in its long axis, the wriggling or lashing of the host causing these movements. When the energy of the trypanosome diminishes, it may be observed that the granules do not swing to and fro synchronously with its movements but perceptibly later; apparently there is an interval for the transmission of a wave, the granules lying more or less free within the envelope of the trypanosome. This activity of the granules gradually increases in the wet preparation, and is further exaggerated if the trypanosome becomes anchored by the posterior pole and exhibits lashing movements of the body and flagellum; the granules are then seen to be perpetually dancing in every direction within the body, sometimes impinging on the cell membrane and rebounding from it. I do not suggest that the trypanosome is actually trying to discharge the granule by its movements, but the process appears very purposeful, and the granules seem as if they were anxious to get free. Finally the granule succeeds in its efforts and shoots out into the surrounding medium; it has been noticed that, before being shed, the granule in many instances approaches the surface, and may actually bulge out the covering membrane.

In older preparations the trypanosomes begin to show signs of fatigue and later of degeneration; this may be due to change of temperature, but is probably the effect of the powerful light to which they are exposed. They move sluggishly and sometimes become swollen and bloated. At the same time the granules exhibit changes, both in number and size. Instead of what may be regarded as the normal three or four granules of *T. gambiense* there may be five or six; frequently one or two are larger than the others, and sometimes there are very small granules in pairs closely apposed and connected in some way, as they move in unison and the transmitted wave affects them together. (The questions arise: Is this multiplicity due to fission? and is it only the larger granules that are concerned with a reproductive process?) At this stage granules may still be extruded, but when the trypanosome becomes even less active, extrusion is very uncommon. A later stage is reached when a trypanosome loses its natural form, swells up and becomes almost circular, while still showing one or two granules which it is unable to extrude. On the other hand, a trypanosome may be seen normal in form but quite inert and not containing any granules; it would seem, however, to be exceedingly rare for a trypanosome to discharge all its granules.

The occurrence of granule shedding is quite distinct, but is, I believe, relatively uncommon in normal circumstances. It is exceedingly easy to be deceived, as in these preparations there are countless dancing bodies—haemoconia and leucocyte granules, which impinge on the trypanosome, and are flung away by its lashing movements; also it is possible for these particles to adhere temporarily to the envelope of the trypanosome, and be detached at any time by some forcible movement. The objection may be raised, How can one ever be sure of extrusion of a "granule" if this fallacy be admitted? This, however, can be met by pointing out that, if particles should adhere to the trypanosome, they cannot swing to and fro in its long axis. Again, the larger granules have been seen to escape from a mori-

bund trypanosome which was quite incapable of forcibly detaching particles, as its movements were of the feeblest character. A useful standard is to recognize extrusion of a granule only after the trypanosome has been under observation for some time and the swinging of the granules carefully watched.

When free in the wet preparation the granule seems to be rather larger than the small particles known as blood dust. It shows two forms—one circular, the other pear-shaped—not unlike a common form of poikilocyte in stained blood films. The explanation of this seems to be that it is actually pear-shaped, but when looked at "end-on" a circular appearance is presented, as the base of the pear-shaped body is nearer the observer's eye. There is more than sufficient depth of fluid between the slide and cover-slip of a wet preparation for a small body like the granule to turn over on itself; therefore, if the granule, while circling in the free fluid, turns from the "end-on" position to a direction parallel with the slide, it displays its long diameter and is seen to be pyriform. It seems improbable that it actually changes its form so rapidly.

In the granule immediately after extrusion there appears to be no flagellum, but later it is indicated, though in gland puncture preparations it is indistinct. A point in favour of the existence of a flagellum is that very frequently there is to be seen a minute particle of blood dust, apparently attached to the granule by a short invisible filament; for some time the particle follows all the movements of the granule, but is afterwards left behind. This seems as if the particle had been attached temporarily to the flagellum, which was too delicate to show up clearly in the space intervening between the granule and the particle.

The difference from blood dust, leucocyte particles, etc., is clearly brought out by focussing. When the granule is slightly out of focus there is seen to be a very much greater disturbance of the medium round about it.

Motility is distinct. The granule may be carried along in the various currents and eddies encountered in wet preparations, but at other times it moves across or against the stream, and in open lacunae where there are no obvious currents it may be seen to progress across the field in any direction.

The dark ground illumination gives a better picture of the granule within the trypanosome, but the vital staining method suggested by Balfour[2] demonstrates the extruded granule much more clearly. By this means the granule within the trypanosome shows as a dark-coloured dot against the clearer cytoplasm, but the free granule, even in its earliest stages, stains well, and is seen as the small motile pyriform body turning over on itself. A flagellum appears soon after extrusion, and is a more distinct feature than in the dark ground preparations; this gives the granule the appearance on a very small scale of a tadpole with a short tail. I have never seen a flagellum showing undulations. It has been noted in a case with very scanty trypanosomes and granules that one granule lying close to a trypanosome had a well-defined short flagellum; this is evidence in favour of its early development, as it is highly probable that the granule had been recently extruded and sufficient time had not elapsed for the granule to move far away from the parent trypanosome, while the latter contained only one granule and was very sluggish, bearing a close resemblance to trypanosomes seen in the dark ground after they had extruded granules.

Motility is made very evident by vital staining, and frequently a granule has been watched making its way over half the diameter of a field.

Fresh blood preparations from various animals have been examined by vital staining, and observations made as to the presence or absence of the granule. A few of these cases may be quoted:

1. A rat, inoculated with a drop of gland juice, was examined on the eighth day; five slides were prepared, but in a prolonged search no granules were seen. This rat did not become infected.

2. Mule sent for examination as nagana was suspected. Blood examination by the ordinary method was negative on more than one occasion. After a long search through many slides (vital stain preparations) one very suggestive, though non-flagellated, granule was seen, but no trypanosomes. In view of this granule I suspected strongly that the case was positive, and the following day, after many examinations, a trypanosome was found with an actively motile flagellated granule in the same field. This case may almost be said to have been diagnosed by the discovery of the granule at the first examination.

3. Monkey infected with *T. gambiense*. At an early stage of the case five wet preparations were made; only one trypanosome was seen, but motile granules were present in all the five slides.

4. Mule suffering from epizootic lymphangitis; granules were not seen.

In gland puncture vital stain preparations from man motile granules were never seen in a case that did not prove positive by the discovery of a trypanosome.

Granules have been found in fluid obtained by puncture of internal organs—liver, spleen, and lungs—but the number to be seen in such preparation does not seem to bear a definite relation to the severity of the gland infection. It is, I think, probable that the granule undergoes development in the internal organs, and suggestive forms have been seen. Some phenomena have also been noted after treatment. Further observations are to be made on these points.

SUMMARY.

1. The "infective granule" of trypanosomiasis occurs in *T. gambiense* in cases of sleeping sickness.

2. Granule shedding has been observed, and the free granule seen in lymph glands and internal organs—liver, spleen, and lung.

3. The granule is at first pyriform, but develops a flagellum. It is actively motile, and can be distinguished from "blood dust."

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THE RESULTS OF SANATORIUM TREATMENT.

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IN this communication we record the results of treatment and the after-histories of 1,102 patients, who passed through Kelling Sanatorium between January, 1903, and March, 1910. We think certain other facts elicited from this number of patients are also worth publishing.

Our patients have been drawn from all parts of England and Wales and the Isle of Man, but more than half of the total number came from London and Norfolk. They belonged to the wage-earning classes, and their admission to the sanatorium depended solely upon their inability to pay the fees of private institutions and upon their being certified as medically suitable. It scarcely need be said that applications for treatment have always exceeded our number of available beds, and that we have never been without a formidably long waiting list. The following information was obtained from these 1,102 patients.

Age and Occupation.

Their average age at the time of the first observed symptom of their malady was 25 years and 10 months; 718, or about 65 per cent., were town-dwellers; 384, or about 34 per cent., were country-dwellers. As regards their employment: Of the 707 men, 71.7 per cent. worked indoors, while 28.3 per cent. worked out of doors. The 372 women were, practically speaking, all employed indoors.

Family History.

A family history of pulmonary tuberculosis in the direct line was obtained from 459, or 41.6 per cent.; 363 patients stated that they had been exposed to the risk of infection from other consumptives, and 37 had occupied infected houses.

Personal History.

The vital importance of proper treatment in the very earliest stages of their disease is our reason for calling attention to the following notes.

The average time allowed to elapse between the first manifestation of the disease and application being made for sanatorium treatment was one year and six months.

The average interval between the first symptom and the giving up of work was ten months.

Furthermore, in the case of 80 patients, there were records of an antecedent tuberculosis, not of the lungs necessarily, which had disappeared from two to thirty years previously. In regard to 428 patients who have died, we find that the average length of time from the date of the first observed symptom to that of death was three years and four months.

On the point of the delay in seeking sanatorium treatment after symptoms of pulmonary tuberculosis have manifested themselves, we made some further inquiries in the cases of 170 patients, all of whom had been ill for a year or more before coming into the sanatorium; 68 were not aware of the true significance of their symptoms, and did not seek advice; 87 were more or less prompt in seeking advice, but radical measures were not adopted in the first instance. While many of this number were sent to convalescent homes or elsewhere for change of air, others were only supplied with medicine at home. In 12 cases it is clear that the nature of the malady was not diagnosed. The remaining 3 patients refused to undergo treatment when advised.

The above statements are partly based on what occurred several years ago, when the exact value of sanatorium treatment was not fully recognized in this country, and when the prime importance of early treatment was not appreciated. During later years a larger proportion of our patients have sought admission in the early stages of the disease, and there is noticeable an ever-increasing desire on the patients' parts to get into a sanatorium as soon as they are declared to have consumption. But even so, the vast majority of our inmates were obviously ill and had unmistakable physical signs of disease in one or both lungs. In the few exceptions the diagnosis was settled by the presence of tubercle bacilli in the sputum, or in a very few instances solely by the occurrence of definite haemoptysis. Some twelve persons altogether were judged not to be suffering from pulmonary tuberculosis, and are not included in this account.

Treatment and Results.

The 1,102 patients were classified as follows, according to the severity and stage of their affection on admission:

Class I (Turban) ...	...	445, or 40.3 per cent.
Class II ...	...	256, or 23.2 ,,
Class III ...	...	401, or 36.3 ,,

We would draw attention to the point that less than half of our patients were taken in hand while their malady was in a favourable stage for obtaining the best results.

The average length of stay in the sanatorium was for each patient a few days over twelve weeks. We had not commenced the use of tuberculin, but graduated labour has been a part of the routine of the patient's day since 1903.

Results of Treatment.

	Total Number Discharged.	Alive.			Dead.	Not Heard of.
		Fit to Work	Unfit to Work.	Total.		
Class I ...	445	289 (64.9 %)	54 (12.1 %)	343 (77 %)	75 (16.8 %)	27 (6 %)
Class II ...	256	107 (41.7 %)	38 (14.8 %)	145 (56.6 %)	102 (39.8 %)	9 (3.5 %)
Class III...	401	75 (18.7 %)	51 (12.7 %)	126 (31.4 %)	263 (65.8 %)	12 (2.9 %)
All classes	1,102	471 (42.7 %)	143 (12.9 %)	614 (55.7 %)	440 (39.9 %)	48 (4.3 %)

The above table includes all patients discharged from the sanatorium during the years 1903 to 1910. A certain proportion of the patients therefore have only been out of the institution a little more than a year, while with others the interval since their discharge ranges up to eight years.

Effects of Indoor and Outdoor Occupations on Discharged Patients.

Of the patients who returned to work on leaving the sanatorium, 61.4 per cent. resumed their former work, 38.6 per cent. took up new work. Dealing only with Class I patients, we ascertained at the end of 1910:

Of patients resuming their former outdoor occupations 80 per cent. were still able to work.

Patients resuming their former indoor occupations, 76 per cent. were still able to work.

Patients who had been formerly employed indoors and who after sanatorium treatment took up outdoor employment, 78 per cent. were still able to work.

So far as the above figures warrant the drawing of any conclusion, it would appear that there is little to choose between outdoor work and indoor work for the discharged patient, but it must be pointed out that the indoor occupations to which our patients returned were of the less injurious kinds. Everything possible was done to prevent them from returning to unhealthy factories and shops. Those who did return to indoor work have been encouraged to observe sanatorium principles as fully as possible. In fairness to the outdoor life it must also be remembered that the clerk or factory hand is at a great disadvantage in attempting outdoor work, for which special training is usually needed.

But the test by which the real value of sanatorium treatment is judged must be the durability of recoveries. In the next table we show the percentages of our patients who were alive at the end of each successive year after their discharge.

	Class I only.	All Classes.
	Per cent.	Per cent.
Living 1 year after discharge	89.5	69.9
Living 2 years ,,	81.5	59.6
Living 3 ,, ,,	71.7	49.2
Living 4 ,, ,,	70.3	45.7
Living 5 ,, ,,	67.0	44.3
Living 6 ,, ,,	64.0	42.1
Living 7 ,, ,,	64.0	40.9

It will be seen that the first three years after treatment are the crucial period. The patients who survive that space of time possess a greater expectation of maintaining their ascendancy over the malady.

During the first triennium after residence in sanatorium there died: Class I, 28.2 per cent.; all classes, 50.7 per cent.

During the second triennium: Class I, 7.7 per cent.; all classes, 7.1 per cent.

We are convinced that the results of the sanatorium treatment of pulmonary tuberculosis promise to become better and better. Attention must be concentrated on the early diagnosis of the disease, and we welcome the advent of dispensaries where facilities will exist for this purpose. Experience has shown that the early consumptive does not discover himself, but must be actively sought out, and that for this work the service of an expert is required. At present the applicant for admission to a sanatorium is provided with a form certifying to the presence of more or less glaring physical signs in his chest. We should aim instead at utilizing our sanatoriums for patients certified to have no physical signs of lung destruction.

A SOMEWHAT belated report by the Inspector-General on the condition of the hospitals for the insane in Western Australia for 1910 has reached us recently. On December 31st, 1910, there were 798 persons certified insane in the State, an increase of 14 on the previous year. The population of the State in 1910 was 288,743, so that the rate of insane to sane was: Males, 1 to 296, or 3.37 per 1,000; females, 1 to 534, or 1.83 per 1,000; total, 1 to 364, or 2.74 per 1,000. Compared with the other Australian States, Western Australia has the lowest insanity-rate, with the exception of Southern Australia. Alcohol and venereal diseases are assigned as the principal causes of insanity, but heredity is stated also to play an important part. The forms of insanity most prevalent were delusional insanity, mania, dementia, and general paralysis of the insane. The recovery-rate was good—92 out of 212 admissions. The maintenance-rate seems to compare very favourably with the rate in this country—namely, £38 5s. 1d. a head per annum. When patients' fees and receipts from farm produce is deducted, the actual cost is reduced to £33 0s. 1d. per patient.

A NOTE UPON THE USE OF ANTIFORMIN IN SPUTUM EXAMINATION,

AND ON STAINING METHODS FOR THE DEMONSTRATION OF TUBERCLE BACILLI.

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SINCE the routine examination of sputum as a means of diagnosis for tubercle became a universal practice, it has been recognized that diagnosis might be rendered more precise by some satisfactory method of rendering the sputum homogeneous, and dissolving the non-tuberculous elements therein contained. For this purpose such reagents as caustic alkalis, hydrogen peroxide, etc., were tried with a certain measure of success. The procedure of Ellermann and Erlandsen (1908), which consisted in autodigestion of the sputum in the presence of dilute sodium carbonate, and subsequent treatment with dilute sodium hydrate, was shown by careful workers (Jörgensen, 1910) to give results superior to those obtained with antiformin, but, nevertheless, the introduction of this latter reagent must be regarded as the chief recent advance in this branch of study. Antiformin is a proprietary substance which is made up of equal parts of caustic soda 15 per cent., and liquor sodae chlorinatae. It was first used in breweries for cleansing vats and for general disinfection. It is a very powerful solvent of organic substances, rapidly causing the disintegration and solution of such materials as pus, mucus, connective tissues, faeces, and hair. Waxes and waxy substances alone resist its action. Uhlenhuth and Xylander (1909) studied its solvent and its germicidal powers, and published the description of a method for its application to the investigation of tuberculous material. They found that, whereas other bacteria dissolved in the reagent as rapidly as sugar in water, tubercle bacilli retained their vitality in a 20 per cent. solution for twelve to twenty-four hours, and continued to exhibit their characteristic form and staining reactions for eight days.

Uhlenhuth made use of a 20 or 25 per cent. dilution of antiformin. This was added to sputum in equal bulk. The mixture was well shaken and incubated at 37° C. for six to twelve hours. Then after centrifugalization the deposit was examined for tubercle bacilli in the ordinary way.

Lorenz (1911) used the same strength of antiformin, but heated the mixture over a flame, thus rendering the sputum more rapidly homogeneous. Haserodt (1909) shook up the sputum and antiformin mixture, after it had become homogeneous, with ligroin, and placed the mixture in a water bath at 60° C. The lighter fluid rising to the top, carried with it the tubercle bacilli, which collected at the zone of junction between the two layers of fluid. For this method no centrifuge is required.

When rapid concentration of tubercle bacilli in sputum is required, Hammerl's method (1909) is satisfactory. One part of sputum is shaken up with two parts of a 1 per cent. solution of caustic potash in strong ammonia. The mixture is incubated for half an hour, being shaken up from time to time. Then, after the addition of one part of acetone, to lower the specific gravity of the liquid, it is centrifugalized and the sediment examined. This method I have tried in a number of cases with good results. By this means, however, tubercle bacilli are rapidly killed, and therefore the method cannot be used for the purpose of obtaining pure cultures of tubercle. Antiformin, which does not kill tubercle bacilli if used in sufficient dilution, is well adapted for such cultural purposes.

In the routine work of the Lister Institute, the sample of sputum is mixed with an equal quantity of a 30 per cent. solution of antiformin, and the mixture is incubated overnight at 37° C. After centrifugalization, the supernatant fluid is poured away and replaced by an equal bulk of normal saline solution. This is shaken up with the deposit, and the mixture again centrifugalized. Films from the deposit thus washed adhere better to the slide than those prepared after one centrifugalization only.

The antiformin is diluted for use with distilled water. It was suggested by Beitzke (1910) that the use of tap water for this purpose might introduce a fallacy, owing to the occasional presence in such water of acid-fast bacilli. Organisms of this type have been found on water taps at the Lister Institute.

Results Obtained with the Antiformin Method.

Since March, 1911, all sputa received at the institute and found negative on direct examination have been treated with antiformin in the manner described above and further investigated. The number of examinations has been relatively large, and it has therefore been thought that statistics based upon these data would possess sufficient value to justify this note.

The number of sputa received for investigation during thirteen months has been 2,273. On direct examination 622 were found to be positive. The remaining 1,651 specimens, which gave negative results on direct examination, were treated with antiformin, and further investigation showed the presence of tubercle bacilli in 9 cases. The percentage of cases found positive on direct examination was thus 27.36, and the percentage of all positive cases 27.76. The cases found positive only after they had been treated with antiformin amounted to 0.4 per cent. of the total number of sputa investigated, and to 0.54 per cent. of those found negative on direct examination. The figure 0.54 may be described more concisely as the improvement percentage.

Comparison with Other Observations.

Other observers have obtained much higher percentages of improvement with the use of antiformin than that shown by our figures. Shortly after the introduction of the method, Meyer (1909) published a report upon the examination of 114 samples of sputum. Fifteen were found positive on direct examination. The remaining 99 samples were treated with antiformin, and further investigations revealed the presence of tubercle bacilli in 14 cases. Other contributions to the literature of this subject, too numerous to be cited in detail, give improvement percentages ranging from 10 to 35. Schneider (1912) has recently made a comparative study of some of the principal modifications of the antiformin method, and has obtained such improvement percentages as 17.5 and 22.8. He recommends the use of 15 per cent. antiformin, and that the examination be made as soon as possible after the material has become homogeneous. For the demonstration of bacilli, when very few are present, he considers the method of Lorenz the most satisfactory. Upon methods involving the use of ligroin and allied substances he reports unfavourably, being of opinion that such materials have a detrimental effect upon the staining powers of acid-fast bacilli.

In order to reconcile the results obtained at the Lister Institute with those quoted above, it is necessary to consider the procedure that is followed here. Care is taken in the first instance to select a suitable portion of the sputum for examination. The film prepared from this is examined, if need be, for four minutes. In the majority of cases tubercle bacilli, if present, are discovered within the first half-minute, but in a number of cases they are only detected after three or four minutes' search. Moreover, in two of the nine cases in which they were not found until after antiformin treatment, reference back to the original film showed the presence of one or two bacilli. The slides prepared from material which has been treated with antiformin are examined with no less care than the original film. Here bacilli, if present, were usually found in large numbers, but in one instance they were only discovered after a protracted search. In this connexion it is interesting to note the work of Meyer, who investigated the twenty-four hours' sputum of a number of sanatorium patients, and found in some cases such small numbers as two, four, or six bacilli.

No paper previously published upon the subject deals with such a large number of specimens as the present one, and the results of these observations appear to show that the greater the care expended upon the examination of the direct film, the less will be the apparent gain with the use of antiformin. This does not detract from the value of the antiformin method, as an improvement percentage as low as 0.54 involves an approximation to complete precision, which is of importance when the number of specimens examined is large.

SUMMARY.

By means of treating with 25 per cent. antiformin 1,651 samples of sputum found negative as a result of the direct examination, it was possible to demonstrate the presence of tubercle bacilli in 9 cases, that is to say, in 0.54 per cent.

of cases. This figure, though small in comparison with those obtained by other workers, is large enough to justify the use of this reagent when a large number of specimens are examined. The discrepancy between these results and others is possibly due to the detailed care which is expended upon the direct examination.

STAINING METHODS.

A comparative study of the efficacy of certain staining methods for tubercle as applied to sputa has been carried out with a series of about 200 sputa. The methods dealt with have been those of Much, Herman, and Gasis.

Much's Method (1907) is a modification of Gram's method. Of the three different processes described by Much the following has been used. The fixed film is treated for a few minutes with hot carbol-methyl-violet solution (10 c.cm. of hot saturated alcoholic solution of methyl violet in 100 c.cm. of 2 per cent. carbolic acid). The slide is washed, and treated with Lugol's iodine for one minute, 5 per cent. hydrochloric acid for one minute, 3 per cent. hydrochloric acid for ten seconds, and a mixture of acetone and absolute alcohol in equal parts to complete the decolorization. One per cent. neutral red may be used as a counterstain.

Herman's Method (1908).—The stain, a 3 per cent. solution of crystal violet in 95 per cent. alcohol, and the mordant, 1 per cent. ammonium carbonate solution, are kept in separate bottles, and mixed for use in the proportion of 1 to 3. The fixed film is stained with this mixture over a small flame for a few minutes. The slide is washed, transferred to 10 per cent. nitric acid, and then to absolute alcohol. Herman does not use a counterstain, but in the present investigation a 0.3 per cent. chrysoidin solution has been found of service.

Gasis's Method (1907).—Corrosive sublimate crystals amounting to the size of a pea are boiled in about 5 c.cm. of a 1 per cent. eosin solution (eosin 1 gram, absolute alcohol 5 c.cm., distilled water 95 c.cm.). The hot stain is filtered on to the slide, and staining over the flame is allowed to proceed for two minutes. The slide is washed and then decolorized with alkaline potassium iodide solution (potassium iodide 1 gram, sodium hydrate 0.5 gram, 50 per cent. alcohol 100 c.cm.) and with absolute alcohol. Acid methylene blue is used as a counterstain.

Much claims that by the use of his method it is possible to demonstrate tubercle bacilli which are not shown in preparations stained by the Ziehl-Neelsen method. This granular non-acid-fast type of tubercle bacillus has been investigated by a number of workers, who have demonstrated its presence in tuberculous matter where no acid-fast bacilli of the ordinary type were to be found. Much also describes granules, visible in preparations stained by his method, but not seen in Zeihl-Neelsen slides, which are capable of causing tuberculous disease when inoculated into guinea-pigs.

Herman's method has been in use for a number of years, and its author claims that it is superior to the Ziehl-Neelsen method. He lays stress upon the advantage of using ammonium carbonate as a mordant, and states that in preparations stained by this process there are seen not only the bacilli which can be shown by the Zeihl-Neelsen method, but also the granules and granular bacilli described by Much.

Gasis's method differs essentially from the foregoing in that it is based upon the alkali-fast and not the acid-fast property of these organisms. It is stated that the alkali-fastness is due to a nucleo-protein and not to a waxy component of the bacillus. The method was first introduced for the purpose of demonstrating tubercle bacilli in the urine, and the claim was made that in urinary sediments so stained, morphological characters distinguishing these organisms from smegma bacilli were rendered obvious.

Application of Staining Methods to Sputum Examination.

A series of 206 sputa were investigated by the methods of Ziehl-Neelsen and Herman. One hundred specimens were examined also by Much's method, and in 48 of the cases Gasis's process was also employed.

No. of Specimens.	Positive Results with			
	Ziehl-Neelsen.	Herman.	Much.	Gasis.
206	51	51	—	—
100	30	—	29	—
48	13	—	—	9

If the Ziehl-Neelsen figures be regarded as expressing 100 per cent. of accuracy, it is found that the other methods—Herman's, Much's and Gasis's—give respectively the figures 100, 96.66, and 69.23, indicative of their relative accuracy.

Gasis's method is the most unsatisfactory. The reagents are unstable, and require to be freshly prepared at the time of use, the staining process is troublesome and requires careful watching, and the results are uncertain, as the figures show. It possesses, however, considerable scientific interest, due to the peculiar biochemical reaction which underlies it. Bacilli stained by this means have a rose pink tint. The outline is well defined, and there is frequently to be seen some degree of granularity and of irregular vacuolation.

Much's method is not suitable for the direct examination of sputum, owing to the fact that a large number of Gram-positive cocci and bacilli other than tubercle take up the stain. This renders the process of search so troublesome that the routine use of the method for sputum diagnosis is not to be recommended. Tubercle bacilli so stained possess a highly granular character, and assume at times a streptococcal type, while free granules of the Much type are occasionally to be seen. The examination of the present series of films from sputum did not, however, afford any independent evidence of the existence of a type of tubercle bacillus demonstrable by this method which would not be shown more satisfactorily when stained according to Ziehl-Neelsen. The impression derived from a study of these specimens was rather that the marked granularity of tubercle bacilli on the Much-stained films was an artefact due to the nature of the staining reaction employed.

Herman's method is the only one of the three which can be compared with that of Ziehl-Neelsen for ease, utility, and efficiency. The necessity for keeping the solutions of ammonium carbonate and of crystal violet separate until they are required for use introduces a slight complication, which leaves the Ziehl-Neelsen method as the easiest, as it certainly remains the most efficient, process at our command. It is largely a matter of individual taste whether it is more desirable to search for violet bacilli upon a yellow ground, as with slides stained by Herman's method, or for red bacilli on a blue ground, as with Ziehl-Neelsen; but when the eye has become trained to one method, it requires to be educated afresh before equally satisfactory results are obtained with slides stained otherwise. Bacilli stained according to Herman present interesting morphological characters. Their outline is often irregular and granularity is well marked. Metachromatic spore-like granules were frequently noted, and branching forms were observed on two occasions.

An interesting account of various methods of staining tubercle bacilli, describing the earliest processes, which possess now a purely historical interest, and giving a comparative study of the efficiency of the recent methods, has recently been published by Böhm (1912). This author considers the method of Gasis interesting but unreliable, and finds the Ziehl-Neelsen method superior to all others.

The results detailed above show that the Ziehl-Neelsen method, which has stood the test of time, remains the most suitable of all for the detection of tubercle bacilli in urine. Next to it comes the method of Herman, almost as simple, quite as easy of execution, and giving equally good results. Much's method is not suitable for direct investigation of sputum, and the method of Gasis is both difficult and unreliable.

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THE Port of Karachi is to be opened, in addition to Bombay, for the embarkation of pilgrims to Hedjaz, from the current year. A camp is to be constructed for the accommodation of pilgrims and a Protector of Pilgrims will be permanently appointed.

THE PIKRIN METHOD OF STAINING TUBERCLE BACILLI.

BY HORACE WILSON, M.D., B.S.LOND.,
HAYES, MIDDLESEX.

THE pikrin method of staining tubercle bacilli, as set forth by Spengler,[1] is worthy of more frequent employment in clinical work in this country. In simplicity it is not inferior to the Ziehl-Neelsen method, and, when carefully applied, it has a more far-reaching range of utility. I have found it far superior to the Ziehl-Neelsen method when applied to the examination of urinary sediments.

It is claimed for it that bacilli deprived of their waxy coating can be detected by this means, and also that degenerate, "splitter," or spore forms may be recognized when unstained by the Ziehl-Neelsen method. As these spore formations under suitable conditions may develop into active virulent tubercle bacilli, it is of the utmost importance to recognize them in sputum from the point of view of infectiveness of a patient. This the pikrin method enables us to do. In support of this contention I would cite a few details of a case in point.

In 1910 Mr. X., who in 1908 had suffered from pneumonia with seven months convalescence, and who had expectorated ever since, noticed his sputum tinged with blood and a slight morning cough. He consulted Dr. T. N. Kelynack, who, suspecting a tuberculous focus, sent him to Crooksbury Sanatorium for observation. He remained a fortnight, during which time I examined his sputum carefully ten times. By the Ziehl-Neelsen method a negative result was obtained eight times. The ninth and tenth times, by the pikrin method, degenerate tubercle bacilli and "splitter" forms were found in fair numbers. Von Pirquet's reaction was extremely well marked, and finally the diagnosis was clinched by a marked reaction to Koch's O.T.

In ordinary clinical work, had the Ziehl-Neelsen method of staining alone been employed, the result would have been negative, whereas the pikrin method would have demonstrated tubercle bacilli.

Regarding the pikrin method in genito-urinary tuberculosis, I have found the yellow counterstain with the ordinary yellowish film shows up the bacilli far more readily than if any method is used which employs methylene blue as a counterstain, and degenerate and splitter forms, which are commoner in urinary sediments than well-developed bacilli, are more easily differentiated.

The centrifuged deposit, being pipetted on to a slide, is dried in a current of warm air some distance from the flame; and the film, which must be thin, then fixed by passing it a few times through the flame of the spirit lamp, taking care that it does not char. It is then stained carefully, without much heat, by the pikrin method. The bacilli appear bright red on a lemon-coloured ground, and, if present, are more perceptible than by any other method. In my opinion, it is the best stain for urinary residues in which the tubercle bacillus is suspected.

Spengler's method is simple, and is conducted as follows:

Having made a suitable film as above—

1. Stain with carbol fuchsin, warm, but without too much heat.
2. Pour off the stain without washing.
3. Pour on picric acid alcohol (consisting of equal parts of saturated solution of picric acid and absolute alcohol); after three seconds—
4. Wash with 60 per cent. alcohol.
5. Treat with 15 per cent. nitric acid till yellow (thirty seconds).
6. Wash again with 60 per cent. alcohol.
7. Counterstain with picric acid alcohol till lemon-coloured.
8. Wash with distilled water and dry gently at a low heat.

With a little practice this will be found an easy and quick method, and the extra time involved in the staining will be more than compensated by the ease with which the bacilli are found if present, and the consequent less time spent at the microscope. This applies particularly to urinary sediments.

[1] *Deut. med. Woch.*, February 28th, 1907, No. 9.

THE Belgian company which maintains a line of steamers to the Congo has arranged in future to pay its medical officers on a sliding scale; during the first year of service the rate will be 300 francs a month, during the second 350 francs, and during the third 400 francs. An engagement may, however, be made for six months only, such period covering three voyages.

EIGHTIETH ANNUAL MEETING

OF THE

British Medical Association.

Held in Liverpool on July 19th, 20th, 22nd, 23rd, 24th, 25th, and 26th.

PROCEEDINGS OF SECTIONS.

COMBINED SECTIONS OF LARYNGOLOGY AND RHINOLOGY AND OTOLOGY.

MR. MIDDLEMASS HUNT, President of the Section of Laryngology, in the Chair.

DISCUSSION ON THE EDUCATION OF THE SPECIALIST IN LARYNGOLOGY AND OTOLOGY.

OPENING PAPERS.

I.—HOLGER MYGIND, M.D.,
Copenhagen.

THE EDUCATION OF THE SPECIALIST ON THE CONTINENT.

I INTEND to deal with the matter by giving first a short survey of the education of the specialist in our two branches of the medical profession as it is at present on the Continent. I shall then point out the defects which I think exist, and suggest their remedies, concluding by touching on the questions of qualification for these two specialities, and of their combination or separation.

There is, of course, no uniform education for the whole Continent, the difference between the various countries being great.

The Continental countries may be divided into three groups according to the extent in which the two specialities are officially taught:

1. Those in which oto-laryngology is officially taught at all, or nearly all the universities of each country;
2. Those in which this is only the case in some of the universities; and
3. Those in which there is no official teaching at all.

I speak of oto-laryngology, and not of otology and laryngology as two separated specialities, for they are united at most Continental universities, and also practised in combination by most Continental specialists. There were, for instance, in Germany in 1909, altogether 463 specialists who practised both otology and laryngology; 50 were otologists only; 68 practised laryngology alone; and 21 practised otology and ophthalmology combined.

But when dividing the Continental countries in these three groups we must remember that the number of universities in a country teaching oto-laryngology is not the sole expression of the development of the education in our branch of the healing art. In France and Italy, for instance, the standard of teaching is high at some universities, to the benefit of the whole country.

There are in Europe, altogether, a little over 100 universities, if we include the *Écoles Préparatoires de Médecine* of France.

The table on p. 414 shows that Germany is far ahead of any other country as to the number of professorships in oto-laryngology, there being altogether nineteen universities with twenty-four chairs, five universities having each one chair for otology and one for laryngology—Berlin, Freiburg, Königsberg, Munich, and Würzburg. At all the other German universities the two specialities are taught together. This is also the case at nearly all the other Continental universities. The exceptions are the following: In Austria-Hungary there are three universities—Budapest, Prague, and Vienna—and in Italy one—Naples—where the two specialities are separated. In

Table Showing the Number of Professorships and Lectureships in Oto-laryngology at the Different Continental Universities, the Teachers of Each University being Generally Divided into Three Classes—Ordinary Professors, Extraordinary Professors, and Lecturers.

	No. of Universities.	No. of Teachers.	
GROUP I.			
Germany	19	24	8 O.P.; 16 E.P.
Austria-Hungary ...	9	7	1 O.P.; 6 E.P.
Scandinavian countries	5	5	1 O.P.; 2 E.P.; 1 L.
Holland	5	4	1 O.P.; 3 E.P.
Switzerland	5	3	1 O.P.; 2 E.P
Roumania...	1	1	1 O.P.
GROUP II.			
Italy...	20	8	3 O.P.; 5 E.P.
France	20	5	5 E.P.
Spain	10	5	5 E.P.
Belgium	4	1	1 O.P.
GROUP III.			
Russia	8	0	—
Greece	1	0	—
Portugal	1	0	—
Total	108	63	

O.P.=Ordinary professorships. E.P.=Extraordinary professorships. L.=Lecturerships.

Leyden (Holland) there is an ordinary professorship in otology combined with ophthalmology, and an extraordinary professorship in rhino-laryngology.

The highest standard of education of the specialist in oto-laryngology is undoubtedly also to be found in Germany. Austria is, however, not far behind, and to Austria is due the honour of having first introduced a system of teaching through the lectures and demonstrations given by the famous pioneers of laryngology in the middle of the last century, a system followed later by Politzer. Thousands of specialists in oto-laryngology from all countries have received an important part of their education from the famous teachers of Vienna and their successors.

Although there is no regular system of education in oto-laryngology in Germany or Austria, we may divide the practical education into three stages, through which the specialist generally passes both in these two countries and in most other Continental countries.

1. *The first stage:* The preliminary education which each medical student receives at the university. It is compulsory in most Continental countries, and extends over a period of one term.

2. *The second stage* is represented by the education which many future specialists receive, after having left the university, at one of the numerous post-graduate courses, which nearly every university and many hospitals offer, and which are given either by professors or by privat-docents attached to the university. In Austria they are, according to Frey, divided into six different kinds: (*a*) Clinical diagnosis and treatment, (*b*) functional tests, (*c*) bedside work, (*d*) surgical practice on the cadaver, (*e*) practical treatment and minor operations in out-patient department, (*f*) demonstrations and lectures on normal and pathological anatomy, histology and physiology, to which quite lately has been added (*g*) pathology and diagnosis of labyrinthine diseases.

3. *The third stage* is the education the future specialist receives as assistant at a special clinic attached generally to a university or a general hospital. At most Continental clinics one or a few of the assistants receive a salary, which, however, generally is small. A special hospital for diseases of the ear and the throat is a very rare thing on the Continent.

This third stage of the education is undoubtedly the back-bone of the whole education of the specialist, and it is only a rare exception that a medical man on the Continent nowadays is universally recognised as a specialist without having been for some time assistant at a public clinic. In Germany and Austria, and also in some other Continental countries, so much stress is laid upon this part of the education that one often meets specialists of considerable scientific reputation remaining assistants at a special clinic for a considerable number of years, in order to stand a good chance when a chair in oto-laryngology is vacant at a university.

After having been appointed assistant for a considerable period at a special clinic, and after having given proofs of scientific ability—in Germany an officially approved dissertation must be printed—the specialist may have in Germany, Austria, and Italy, the title of privat-docent conferred upon him by the university. This gives him the right of teaching at the university, and enrols him in that high, and by no means numerous, class of specialists from whom the professors are chosen.

In Italy, where the privat-docents are obliged to give a lecture and a practical demonstration before being nominated, there is, besides, another qualification, as students can select oto-laryngology for their final examination, and receive a certificate, which, however, gives them no special right.

It was originally my intention to go into further details, but I consider this superfluous since the excellent articles written by different Continental specialists have appeared in the *Journal of Laryngology*.

The Defects in the Continental Education.

I. *The Preliminary Education.*—There are, I daresay, some who will not agree with me in calling the instruction which the student receives in oto-laryngology at the university the first stage in the education of the specialist. But I think it is so, and, furthermore, I think it is an important part. For the mind of the student when young is much more open to receive lasting impressions, and in my experience many of the specialist's shortcomings are due to defects in his very first training.

(*a*) One not uncommon fault which the student acquires is superficiality in the examination of the patient. This fault is undoubtedly in many cases due to the teacher not having sufficient time to take each pupil individually and teach him all the details he should observe, because the number of pupils is often too great.

(*b*) Another fault connected with the preliminary courses at many universities is, I believe, the too great stress laid upon lectures. There are nowadays so many excellent textbooks that the student is able to acquire sufficient theoretical knowledge through these, and the exceedingly short time at command can be better used for practical work and especially in more detailed instruction.

(*c*) These preliminary courses do not end in a compulsory examination anywhere except in Germany. It is, however, only nominal there, as the examination is conducted by professors of surgery or medicine.

II. *Post-Graduate Courses.*—I think there is no defect worth mentioning, in that generally there is no over-crowding of pupils, the number in most places being strictly limited. But excellent as they generally are, they cannot, of course, represent a sufficient education for a medical man who intends to settle down as a specialist, as unfortunately many believe.

III. *The Education Received as Assistant at a Public Special Clinic.*—(*a*) The assistants have often, before entering the clinic, a very scanty general medical education, especially in surgery, one of the foundation stones of our specialities.

(*b*) The appointment as assistant is often of too short duration; many future specialists only work at a public clinic for some months.

(*c*) The great majority of public polyclinics or out-patient departments of hospitals are overcrowded with patients, and have comparatively very few well-trained senior assistants. There is, therefore, very often neither time for a thorough examination of the patients nor opportunity for control of the junior assistants by the superintending specialist or by the senior assistants. The cases are, besides, often badly recorded in the case-books, which is the more unfortunate as the same patient is often not treated by the same assistant throughout. I believe these defects of public clinics are very frequent and a very serious drawback to a thorough education of the specialist, and detrimental, of course, also to the patients, who, to be sure, often recover *post* and not *propter* the treatment received.

(*d*) Finally, many clinics in which medical men receive education as specialists have the defect that there are no wards attached to them, the student thus missing the opportunity of seeing more serious cases and larger operations

The defects of the education of the specialist in oto-laryngology which I have just mentioned are, with the exception of the superficial work done at many poly-clinics, not very serious. Anyhow, they do not prevent a young medical man who aims high from getting a thoroughly good education; but there is on the Continent, as everywhere, no regular system of education, the result being that many try to get through their special education as quickly as possible.

Remedies for These Defects of Education.

1. As far as the preliminary education at the university is concerned, I should lay stress upon—

(*a*) A more thorough and more individual teaching of the young student. This is only possible when the number of pupils is limited to ten or twelve to each teacher. In many cases, therefore, the professor must have experienced assistants at his disposal. Thoroughness in examination of the patient is, according to my experience, best taught by letting the beginner study a drumhead and describe all the details he observes. The drumhead has the advantage that the area to be examined is strictly limited and small, and that there are fixed landmarks in relation to which it is possible to localize every little detail minutely.

(*b*) I should further emphasize the importance of principally demonstrating to the student at first only ordinary cases. The student is often too much inclined to look out for rare or "interesting" cases.

(*c*) Above all, a few cases examined and followed thoroughly teach the student to observe and give him better experience than a great number of cases examined superficially.

(*d*) Lastly, I should point out the desirability of a compulsory final examination of each medical student at the university, conducted by the professor who occupies the chair of the speciality.

2. As to the post-graduate courses, I think the only thing to be desired is that they should be supported materially by the university or by the State, thus enabling instruction to be given gratuitously to as many as possible. This movement is already far advanced in Germany.

3. As to the remedies for the defects connected with the education of the specialist at its third stage—that is, when he is appointed as assistant at a special clinic—I think that:

(*a*) No medical man should commence his service as assistant at a special clinic without having been appointed, after his qualification as a practitioner, for at least one and a half years at a general hospital, of which time nine months should have been spent in a surgical department.

(*b*) After having entered as an assistant at a special clinic the minimum service should be one year. This time ought not to be considered sufficient unless the clinic works daily and has wards connected with it.

(*c*) Further, in each special clinic which serves for the instruction of the future specialist a sufficient number of salaried senior assistants should be appointed in proportion to the number of patients admitted. I think it is nowadays indispensable to have at least some salaried assistants at a clinic; they generally do more work and do it more thoroughly than non-paid assistants.

(*d*) Lastly, each such clinic should have wards attached to it for reasons I have stated before.

Qualification of the Specialist in Oto-laryngology.

The status privat-docent in Germany, Austria, and Italy is undoubtedly an excellent means of raising the standard of our speciality and for giving the medical man the stamp of a high-class specialist. In countries where a similar rank does not exist it must undoubtedly be a thing to be desired, but would, of course, take different forms in the various countries. I will not therefore go further into this subject.

Another, and different, question is, Ought there to be a diploma, compulsory or voluntary, representing the minimum required of a medical man intending to practise as a specialist in laryngology and otology?

A voluntary diploma of this sort would not, I think, be desirable, as it would be likely to give the bearer of it a high-class stamp, although the demands only represented a minimum.

I may mention that there is at present a scheme under debate in Sweden by which the Swedish Medical Association would grant specialists a sort of diploma by letting a board examine whether a member possesses sufficient education to entitle him to call himself a specialist. If the would-be specialist satisfied the demands, which should not be specified, each applicant's case being treated specially, he would be allowed to advertise himself as specialist in the papers in the manner recognized by the Swedish Medical Association.

No doubt the problem would be most easily solved by the medical organizations of each country taking the matter into its hands. But I doubt whether it would be the best solution of the question. To my mind a compulsory diploma, granted either by the university or by a special board, would be preferable.

The principal advantage of such a compulsory diploma would be that it would protect the public from such specialists as nowadays set up to practise—in some countries to a greater extent than others—without having sufficient theoretical and practical knowledge of their speciality.

I will only add that I think we have to-day got an opportunity of pushing the question of qualification further by asking Dr. Watson-Williams to take it up either at the International Medical Congress in London next year, or at the International Laryngological and Otological Congresses to be held in Copenhagen in 1915.

We must, however, not be blind to the fact that there are several practical difficulties in the way of the solution of this question; amongst them I should especially mention the necessity of all specialities working together.

As is probably well known, the question of combination or separation of laryngology and otology has been discussed much in Germany during the last couple of years—and the discussion has often been rather warm—without any agreement having been reached. One of the reasons of the disagreement is that these two specialities can never be entirely separated, as every otologist must have some knowledge of laryngology, and vice versa. Another cause of disagreement is that the question of separation or combination is to a great extent a practical one, which must be differently considered according to different circumstances. In smaller towns they will probably always be practised in combination, and it will always be difficult to obtain two chairs at smaller universities, or two departments at smaller hospitals. I think, however, that the greater the development is of the two specialities, the greater will the difficulty be for one man to master them both; and the time will surely come when they will be practised separately by most specialists, and taught separately at most universities.

II.—P. WATSON-WILLIAMS, M.D.Lond.,

Lecturer on Otology, Rhinology, and Laryngology at the University of Bristol, and in Charge of the Departments for Throat, Nose, and Ear at the Bristol Royal Infirmary.

THE education of the specialist in otology and laryngology demands our careful consideration if we are to serve our time and generation to the utmost advantage, for this, not self-interest, must be our dominant and guiding principle. That this question is exercising the minds of our specialist *confrères* far and wide is manifest from the valuable series of authoritative articles on the same topic from Denmark, Germany, Austria, France, Italy, etc., which have been published in the *Journal of Laryngology;* and I may recall to your minds other thoughtful papers, particularly that by Shambaugh of Chicago.

We are fortunate in having secured the co-operation of such distinguished international representatives of our specialist *confrères* as Professors Mygind and Birkett, and as they address you on the subject of our discussion as regards the continents of Europe and America I will confine myself to the position in Great Britain and Ireland.

Most of the more important hospitals associated with medical schools, as well as many other hospitals without teaching clinics, have now instituted departments in charge of specialists. In Ireland usually and in England occasionally our special branches are still associated with ophthalmology; but excluding Ireland, and also hospitals where the special work remains in the hands of general surgeons, I find that there are at least 55 British hospitals where, in all, 713 beds are set apart for throat,

nose, and ear cases, and in many hospitals the accommodation will shortly be increased. This fact alone suffices to prove that, by a general consensus of professional opinion, laryngology and otology are now regarded as special departments, separable from general medicine and surgery in the same sense as ophthalmology and gynaecology, although as yet there is a marked disparity in the position accorded to our speciality in various centres of medical work. What a contrast to the conditions that obtained but a few short years ago!

Antipathy to further specialism lingers yet in the minds of some physicians and surgeons, forgetful that they, the internal physicians on the one hand and pure surgeons on the other, are but specialists who demonstrate the universally recognized advantages of division of labour. And the pure pathologist of to-day does not contribute less to the advance of medicine and surgery because he specializes.

Most of the British special clinics, if under-equipped, are constituted on a sound basis; but in striking contrast are the one or two university clinics, where our *confrères*, men of high distinction in our speciality, have only the arduous out-patient clinics, with no beds allotted to them, and are thus forced to hand over to the general surgeon cases requiring admission for operation. Why a specialist should be made "a hewer of wood and drawer of water" to the surgeon it is difficult to imagine.

Again, in one or two hospitals with a special clinic I find that patients are not regularly referred to the specialist unless they are able to go first to the special out-patient clinic. Apart from the absurdity of providing at considerable cost a special department under the charge of a specialist, and then making it a matter of chance whether the very cases most urgently needing special experience ever reach the special department, these extraordinary regulations unfortunately retard the development of the special department, the material is not used to the best advantage, while the patient's interests may suffer thereby.

One can but grieve at the loss that such hampering regulations must involve, and not to laryngology alone, since a forward step in any restricted field of medical observation redounds sooner or later to the advantage of medicine and surgery generally, for all branches are but members of one body growing towards the light, yet nourished and sustained from one common source.

Now, although the position shows great advances, there yet remains much to be desired, and our medical colleagues, once convinced that our claims are well founded, will undoubtedly assist our endeavours to improve the position. But first we must know our own minds, and we may ask ourselves: What more do we want and why do we want it? My reply is that we want:

1. The due recognition of the sphere of otology and laryngology in the students' curriculum.
2. The more complete organization and equipment of the special departments in many of our teaching clinics.
3. Systematic post-graduate training of practitioners who desire to become specialists, with a distinctive degree or qualification for those who have rendered themselves worthy of such distinction.

The more one considers the subject of our discussion, the more certain does it appear that each one of these points is involved in the others.

Let us take these points seriatim.

1. *Training of Medical Students.*

Even yet medical practitioners are frequently sent forth as qualified men without adequate elementary training in diseases of the nose, throat, and ear, despite the fact that the curriculum has been extended for the express purpose of meeting this well-known defect. Special subjects should always be separately represented on the faculties of the universities and teaching schools by the heads of the departments concerned.

It is not quite fair to the student to insist on a paper acquaintance with a large number of surgical procedures which he can hardly ever utilize, and send him out into practice to lament his inability to deal with cases which come before him almost daily. Several universities in this country do insist on students attending a special clinic; others do not even go this far. But unless modern methods of professional examination are to be applied to the special branches, the student is practically invited, and sometimes compelled, to confine his serious attentions to those subjects which will help him to graduate. In the Universities of St. Andrews, the National University of Ireland, and the Conjoint Board in Ireland of the Royal Colleges of Physicians and Surgeons are, I believe, the only corporations where such a definite clinical course is obligatory *as well as examination by specialists*. Edinburgh, one of the most advanced centres as regards our speciality, with its splendidly organized teaching clinic, second to none in the United Kingdom, allows its candidates for graduation at the university a choice between pediatrics and oto-laryngology. One may well ask why both are not required? Students should be both trained and examined by teachers who possess as thorough knowledge of otology and laryngology, as we expect of the teachers and examiners in medicine, surgery, or gynaecology.

2. *Inadequate Equipment.*

Now when I speak of the inadequate equipment of so many of the existing special departments I do not refer to the provision of instruments nor to the lack of skill of those in charge of them. But, speaking generally, far too much "hack work" is thrown on the specialist in charge of a clinic for want of trained assistants. It is not very unusual to find that the part-time assistance of a frequently changing house-surgeon, who has had no more training than usually falls to the lot of a newly qualified man, has to suffice in this country, even when the amount of material necessitates the provision of *trained* assistants if the specialist in charge is to have adequate opportunities either for training students and practitioners, or for original investigation and research. In these respects we are for the most part lamentably behind Germany and Austria and some other foreign clinics.

Now the training of students and the better organization of special departments are not the immediate subject of our discussion, yet they constitute strong reasons for setting our house in order and determining what a specialist should connote.

3. *The Education of the Specialist.*

Let us consider the education of the practitioner who desires to restrict his practice to laryngology or otology or both, and aims at the charge of a special clinic.

The original charter of the Royal College of Physicians states that the reason for their incorporation was to "check men who profess physic rather from avarice than in good faith to the damage of credulous people." Why, then, should a member of the profession be free to assume a title which is intended to convey to his medical colleagues and to the public at large that he has acquired special knowledge and experience, unless he has had that amount of training that fairly entitles him to do so? Yet three months' work in a special clinic, and even less elementary training, is sometimes the sole credential of the self-styled specialist!

Physicians and surgeons cannot guard their titles as implying special experience in their own spheres, but they do safeguard their respective special degrees and diplomas, which not only their colleagues, but also the general public, apprise; and it is a question for our serious consideration whether or not we should do well to copy their example by affording facilities for a qualified practitioner taking a higher qualification in his speciality after a course of post-graduate study and practice *parallel* to that required of the consulting physician or the general surgeon.

Nothing is more obvious than that the greatest contributions to the recent progress of medical work in any field have generally come from those who have had large opportunities for practical experience in relatively restricted fields of observation; and as a hospital clinic—medical, surgical, or special—affords peculiar opportunities for scientific investigations and advancement of knowledge, those who hold office should regard their posts as trusts, and as far as possible render themselves competent to make such opportunities fruitful, not for themselves only, but for the credit of their school, for the benefit of the profession, and for the sake of humanity at large. The consulting physician and the surgeon have determined for themselves the particular training that will best fit them

for medical or surgical clinics. Why should not we as specialists do likewise?

No one could be more opposed to too early or too narrow specialism than I am, for it is certain that a sound upbringing in medicine and surgery is the only safe foundation for any special branch. But the tendency is to make another speciality, general surgery, the academic test of fitness in laryngology, while medicine, and even systematic training in our department, is made a secondary consideration, with a consequent danger of our becoming too exclusively surgical. Our kingdom cannot be divided into medicine or surgery, and we must divest our minds of the prejudice for ranging under one or two banners, for it is essential to the continued development of our own special branches on sound lines that they should be superstructures, broad-based on the whole range of general medicine, lest we exemplify the old Indian proverb: "A surgeon who is no physician is like a bird with one wing."

Those who specialize in laryngology and otology should have the advantage of a thorough acquaintance with the acquired anatomical facts and the physiology and pathology of the ear, nose, and throat, including the relationship and bearing of other territories on these regions—for example, diseases of the nervous system and the eye—with the history and development of operative measures, as well as wide clinical experience in the diagnosis and current methods of treatment of diseases of the ear, nose, and throat, and when the practitioner has undergone the requisite course of special training he should have the opportunity of proving his proficiency.

It is unwise to prolong unduly the probationary period leading up to an examination; our aim should be to ensure that a specialist has been properly trained in his department, and then leave him to develop by personal experience and make his own reputation. Hence before a candidate can present himself *at least* two years should elapse after qualifying for practice, and, in addition to one year devoted to general hospital practice, one year at least should be spent in attending regularly and exclusively recognized special clinics and courses in practical and theoretical special anatomy and physiology, etc. [Possibly it might be considered wise to extend the period to five years' post-graduate experience before the special qualification was conferred, in which case no further examination but the presentation of a thesis should suffice.]

The examination should be as thorough as that required for the higher medical or surgical degrees. For example:

First day: Three hours' paper on special anatomy (including embryology) and physiology.
Oral examination on specimens, and anatomical dissections, etc.

Second day: Three hours' paper on laryngology, rhinology, and otology.
Three hours' paper on general medicine, surgery, and pathology in relation to the special branches.

Third day: Examination and report on at least one ear, one nose, and one throat case.
Viva voce examination, demonstration of clinical methods of examination of patients, etc.

A system of post-graduate education should encourage the advancement as well as the acquirement of knowledge, wherefore full provision should be made for the original thinker.* I would suggest, therefore, as an alternative, that any candidate, having been qualified five years and who has held office in or who has regularly attended recognized special clinics for three years, might present an original research or thesis, which, if considered of sufficient merit, should exempt from a part or the whole of the examination at the discretion of the examining board.

I must touch on the vexed question of keeping apart or linking together otology and laryngology, for while of course they are separable specialities, the nose is an everlasting highway between them. Neither an otologist or laryngologist can afford to leave out of consideration the ear, nose, or throat, and to attempt to keep these branches apart when we are dealing with education would be like asking the chemist to abjure physics, and vice versa. The chemists and physicists do not merge because a knowledge of both chemistry and physics is the essential basis for a common academic degree, so shall we find that the fuller and more scientific training of the otologist and laryngologist in common will constitute the surest means of ensuring further specialization within our own territory.

But if the prevailing tendency to combine otology and laryngology persists, it will be due to factors far stronger and more deeply rooted than a common academic qualification.

As far as I can ascertain, the only examining body which hitherto has afforded opportunities for the examination of post-graduates who desire to specialize in laryngology and otology is the Royal College of Surgeons of Edinburgh. For their Fellowship each candidate is required to undergo examination in one special branch of surgery in addition to general surgery.

I gather that the examination extends over three days—namely:

First day: Two hours' paper on general surgery.
Two hours' paper on the candidate's special subject.

Second day: Two clinical cases in general surgery and cases on the special subjects are investigated by the candidate, who is subsequently examined viva voce on the result of his investigation. He is also questioned on the uses of various instruments.

Third day: A viva voce examination on general surgery, and on the special subject, when specimens are exhibited and described.

The time devoted to the special subject is about the same as that to general surgery.

While this is certainly a liberal move in the direction of providing a post-graduate qualification in the various specialities comprised in their list, it is open to criticism.

First.—There are no regulations laid down beyond requiring that the candidates shall have attained the age of 25, and shall have been engaged in practice for at least two years. Beyond that, the sole test is the ability of the candidate to satisfy the examiners in general surgery and in his special subject. Surely it is of far greater importance that the candidate should have worked for a specified period in special clinics; the examination merely serves to prove that he has used his opportunities intelligently. Again, the examination in special subjects should be more thorough than that of the F.R.C.S.E. For instance, recently one candidate had for his two cases a laryngeal carcinoma and a maxillary antral suppuration, no ear case at all, while another candidate had one ear case and one nose case, but no throat case.

Secondly.—The examination presupposes that laryngology and otology are subsidiary departments of general surgery, whereas they should be broad based on medicine as well as surgery, and our speciality to-day owes much to the leavening influence of those whose earlier practice has been medical rather than purely surgical.

A much sounder principle, in my opinion, is that adopted by the University of London, which now grants an M.S. in Odontology open to their Bachelors of Surgery. The fact of a candidate having the B.S.Lond. is sufficient evidence of a thorough knowledge of the principles of general surgery, as far as can be secured by any examinational tests. We may commend also the further regulation that the candidate for the M.S. may submit a thesis or published work embodying the result of independent research, and that if this thesis be judged of sufficient excellence, the candidate may be exempted from a part or the whole of the written examination. The tendency of some universities to grant diplomas in special subjects is, I think, to be deprecated; the course of special training and the examinational tests should be so thorough as to be worthy of a degree ranking with an M.D. or M.Ch., or a Mastership in Dental Surgery.

When we are accorded a proper share in the training of medical students, are duly represented on the board of studies at the universities and schools, and our speciality figures as a unit in the medical faculties, with organized and systematized post-graduate education, with opportunities for acquiring a distinctive qualification, we shall no longer be persuaded that the best preparation for a laryngologist and otologist is training to pass an examination on the details of prostatectomy, gastro-intestinal surgery, and almost everything but what pertains to an exact knowledge of our own territory, which is to be "picked up" as he wends his way.

*This would enable existing specialists of large experience to obtain the qualification.

III.—HERBERT S. BIRKETT, M.D.,

Professor of Oto-Laryngology, McGill University, Montreal.

THAT this subject has interested the profession for many years past is evident from the numerous contributions by writers on the status of specialism in its relation to general medicine, and of the specialists themselves, and I believe the time is now opportune for the medical profession to give expression to their ideas upon the subject, and especially through the medium of such an important body as the British Medical Association. I therefore wish to congratulate the Committee upon the selection of this subject for debate, and trust that the result will be to suggest lines along which the best ideals may be carried out and the object consummated later.

We all realize at the outset the truth of Osler's remarks as to "the danger of attempting to manufacture rapidly a highly complex structure from ill-seasoned material."

> The speedy success [he continues] which often comes from the cultivation of a speciality is a strong incentive to young men to adopt early a particular line of work. How frequently are we consulted by sucklings in our ranks as to the most likely branch in which to succeed, or a student, with the brazen assurance which only ignorance can give, announces that he intends to be an otologist or a laryngologist. No more dangerous members of our profession exist than those born into it, so to speak, as specialists. Without any broad foundation in physiology or pathology, and ignorant of the great processes of disease, no amount of technical skill can hide from the keen eyes of colleagues defects which too often require the arts of the charlatan to screen from the public.[1]

With this broad introduction to our subject, I will proceed to give in detail what is being done in the Dominion of Canada and the United States of America. In Canada we do not for one moment consider the question of educating the specialist in otology or laryngology, because the amount of material at the disposal of the various teaching bodies does not permit of it. Nevertheless, in McGill University at Montreal we have a post-graduate course—and this is the only university in Canada giving post-graduate work—the purpose of which is to instruct those practitioners who wish to be informed of all that is new in medicine and surgery; but in otology and laryngology nothing more than the rudiments in those branches are taught, and in such a manner that the physician is enabled to recognize what is normal and what is pathological in these special departments. Absolutely no attempt is made to carry the physician further than to better fit himself for the general practice of medicine.

The course begins at the close of the regular session, and is continued for about two months. The cases are drawn from the two large general hospitals—namely, the Royal Victoria and the Montreal General, which have over 500 beds between them, and out-patient departments in these special clinics, which have an attendance of 9,000 patients yearly. Attention is drawn to these particulars merely to show that while Canada is beginning in a small way to instruct the post-graduate, she is as yet not able to undertake the more important training of the specialist.

In the United States of America post-graduate teaching received its birth in the city of New York over thirty years ago, owing largely to the efforts of the late Dr. St. John Roosa. From this beginning it has increased enormously, so that at the present time there is not a city of any size where medical education is carried on which has not its separate and distinct post-graduate institution. To our American colleagues, therefore, is due the credit of first establishing post-graduate work, which, although not perfect, yet is showing marked rapidity of improvement.

The courses of instruction in otology and laryngology, having for their object the education of the specialist, vary considerably in the methods of teaching as well as in the amount of time allotted. To describe in detail the courses given in the various institutions whose curricula I have carefully perused would be wearisome, to say the least of it, so I will content myself with describing the courses as given in the largest medical centres, for it is there the post-graduate teaching is best carried out. The work may be summarized as follows:

In the study of the anatomy of the special regions plenty of material is provided for the carrying out of dissections. Physiological and pathological studies are carried out in the laboratories under proper supervision. From this groundwork the post-graduate passes to clinical instruction in the out-patient department, and, having become more familiar with diseased conditions, takes up a course of operative work on the cadaver. As the student progresses he is given the position of "clinical assistant" in the department, thus enabling him to carry out much of the minor work, and at the same time affording him the opportunity to assist in the major operations. In some of the best institutions a position as resident is available to the more promising student, which allows him still further to widen his experience. The length of time allotted to these courses varies in the better institutions from six months to one year. At the close of one year's tuition the student is given a certificate of proficiency, but only after having passed a severe examination.

From this description it is evident that the ideal course of training of the specialist has not been reached. It is to be noted, for instance, that in these post-graduate courses no distinction is drawn between the teaching of the physician whose knowledge of the special subject is practically a negative quantity and the physician who has already acquired the preliminary training as to methods of examination, etc. The former is practically an undergraduate in those subjects, and no proper provision is made for his teaching. It is this individual who, having acquired a most meagre training, extending from six weeks to three months, is the most dangerous individual in the community, and who brings discredit upon specialism at large. This danger is increased by the issuing of a certificate, which is promptly displayed in his office, announcing that he has reached the position of a specialist.

The question naturally arises as to how the conditions may be met, and the foundation for the future more correctly laid. This, in my opinion, lies with the teaching of these subjects in the medical education of the undergraduate. In McGill University, in particular, where the course of study is, and has been for the past six years, one of five years of eight months each, the student in his fourth year is taught nothing but what is normal in these regions, beginning with anatomical demonstrations and dissections. Following this, the normal tests for hearing are demonstrated and carried out by the students individually. Then they are taught the use of the instruments for examination of these regions of purely normal conditions, in so far as they are met with in the out-patients' clinic.

In the fifth year the student deals with pathological conditions of the more common variety, which are exemplified in the patients themselves and in pathological specimens. The work is carried out in small groups of six men each, and not less than two demonstrations of one hour's duration each are given weekly continuously during the whole of each session. At the close of the session a clinical examination for the fourth-year student is held, and in the case of the fifth year both a written and oral examination is exacted. The work in these departments is obligatory.

I feel that such courses of instruction very well meet the needs of the general practitioner. If the medical teaching bodies would follow such a course, insisting upon otology and laryngology being compulsory subjects, it would make the way much clearer and simpler for the education of the specialist in these departments. In the Dominion of Canada the various provincial licensing boards not only demand attendance upon the subject during the student's career at college, but also have an examination upon them for the licence to practise. In many of the colleges and universities of the United States of America otology and laryngology are made elective subjects instead of compulsory, and it is at this very point that post-graduate teaching signally fails.

Having laid the foundation work of an embryonic specialist, I will now state what I consider to be best in the preparing of the specialist of the future.

A graduate who studies to be a specialist in any line needs also the education which will give him depth, background, and the historical significance of civilization and life in general, such as one might expect to find in a graduate in Arts. He should graduate from the best medical university. After graduation he should become a resident of a large general hospital, with the idea of not only enlarging his knowledge of medicine and surgery, but also of having his mind properly trained in thoroughness and detail. After one year of such training he should

engage in general practice for a couple of years for the purpose not only of becoming self-reliant, but also for the purpose of knowing human nature more intimately, which certainly cannot be obtained in hospital routine to the same degree.

The foregoing would, in my opinion, be an admirable foundation for the future specialist. If such be the beginning, how should the training be continued? In this portion of the subject I am in accord with Shambaugh,[2] of Chicago, who has written two very able papers on this matter, and whose views I quote somewhat at length. This training should be as much in the fundamental sciences of his speciality as in the clinical side. That is, special courses in embryology, physiology, and pathology should be taken up and studied for one year, and the only places in which this work can properly be done are those universities and colleges in which adequate facilities are afforded by well-equipped laboratories. This work should be put on the basis of genuine graduate work leading to the granting by the university of a higher degree, the degree of Doctor of Philosophy in Medicine. The offering of such courses, even by one or two of our best-equipped universities, and the granting of a higher degree, would serve to stimulate higher ideals and better preparation in the physicians all over the country entering the practice of specialities. These courses could readily be followed out during the two years which the individual would be engaged in general practice. It would be the means of keeping him fully occupied at a very critical period of his professional life, and at the same time considerably reducing the period of time allotted to his preliminary preparation.

Subsequent to this the would-be specialist should spend one year in acquiring the clinical side of his work at one of the well-recognized post-graduate schools. This work should be rounded off by a visit of several months to British and European centres, whereby his mental horizon would be enlarged through acquaintance with the work of those, and the individuals themselves, who are the representative men in their own respective countries.

Whilst such a plan as the foregoing might be followed by a few who have the best interests of the profession as well as their own at heart, yet there is, and will be, a larger number of medical men who, wishing to enter this special field of work, will do so by the shortest route and quickest method. It is these latter whom not only the profession but the laity must fear and suffer as a consequence of their ill-matured training. How can such be prevented? It can only be done in one way, and that is by legislation. If the term "specialist" implies, in the mind of the profession as well as the laity, a higher education, then it seems to me only right that those who make use of such a title should prove their qualifications by examination before a properly qualified board.

One more suggestion, in conclusion. The multiplicity of special societies, as is found particularly in the United States of America, is a distinct impediment rather than an assistance in promoting the advancement of our speciality. One really good association for those doing work in otology and laryngology, meeting once a year, would give ample opportunity for the presentation and discussion of all that is new and important in the progress of our speciality. Such an association could be attended by all those who are interested in this field of work, whether they are recognized as members prepared to take an active part in the discussion of the various subjects or not. The multiplicity of special societies simply tends to stimulate the filling of literature with statements which add nothing new, and which have for their purpose chiefly the advertising of the writer.

References.

[1] Osler, "Remarks on Specialism," *Boston Med. and Surg. Journal*, 1892. [2] George E. Shambaugh, "The Preparation of the Specialist," *Journal of the American Medical Association*, 1907.

DISCUSSION.

Mr. T. Mark Hovell (London) considered it essential that examination in laryngology and otology should form part of the final examination, and that it was a grave retrogressive step to separate in hospital practice the departments for treating affections of the throat, nose, and ear. As regards the education of the specialist in laryngology and otology, in addition to a sound general education it was essential that he should be well qualified in all special subjects and especially in ophthalmology, dermatology, gynaecology, and bacteriology. A knowledge of gynaecology would enable the cases of throat trouble due to the reflex irritation of pelvic disorder to be detected and referred to a specialist in that department. In support of this he cited several cases as examples in which treatment by a gynaecologist had relieved disorders of the throat and even of the ear. Mr. Hovell concluded that, broadly, without some knowledge of such special subjects the laryngologist was apt to be too microscopic.

Mr. F. H. Westmacott (Manchester) said that they had to consider (1) the education in special subjects for those about to engage in general practice, and (2) those who intended to devote their lives to the special practice of the regions of the ear, nose, and throat. For the former a compulsory attendance at a recognized clinic to examine cases and attend demonstrations was all that was necessary, provided questions were asked in these subjects at the final examination for a degree. He should be trained to the use of instruments of diagnosis, and learn to recognize the normal from pathological appearance of the various organs. For the specialist the requirements were: (*a*) A higher degree; (*b*) a residence in a general hospital as house-surgeon and house-physician; (*c*) a thorough knowledge of the anatomy and physiology of the nose, throat, and ear, acquired by the study of skilful preparations and dissections; (*d*) a close and intimate study of cases in a clinic of large dimensions and variety of cases, operations, and after-treatment. He could say without fear of contradiction that this training could only be obtained in the clinics of the larger university towns on the Continent. From personal knowledge he had learned that one must go through the higher special training in a place where all the material could be collated and systematically dealt with. He thought the question of a special degree was quite impracticable and unnecessary. Practical training, and not theoretical, was what they required. In this country there were no clinics where first-rate men could devote the necessary time to hospital teaching, owing to the large size of their private practice, and they had not an adequate staff of highly-trained assistants or the number of cases and materials to carry out the education required. This was possible abroad, owing to the chairs at universities in these subjects. The work for teaching a student and that for a specialist were widely different; while the former could and ought to be carried out in every medical school, the latter was possible only in a few selected places.

Dr. Jobson Horne (London) argued that it was not necessary nowadays for the embryo specialist to go abroad. He thought that anatomy and histology were of prime importance. They were somewhat handicapped in this country by having to deal with people who had hardened their hearts against specialists. Instead of granting a certificate, he was in favour of the student having to write a thesis. It was time that they set to work to break up the notion that any one was fit to do throat, nose, and ear work. He thought that all specialists should be examined by the State before being allowed to assume the title.

Mr. Robert Woods (Dublin) suggested that while the professional education of the specialist was of the highest importance, the education of the student's eyes and fingers in a physical laboratory or workshop should not be lost sight of. This matter was of even greater importance in the case of the oto-laryngologist than the ordinary practitioner. The student could then before he entered for medicine at all educate his tactile and muscular senses, and acquire a practical knowledge of the properties of matter in a way that must prove of the greatest advantage in the practice of a branch of the profession which was essentially a manipulative one.

Dr. William Permewan (Liverpool) agreed with other speakers that England was far behind most other countries in the teaching of oto-laryngology. They were in a condition of utter chaos in this country. Apart from the question of higher degrees, and making their subjects compulsory in qualifying examinations, the position of the

specialist was still in some hospitals extremely difficult and anomalous. The position of the specialist should be on exactly the same plane as that of the general surgeons and physicians. He was inclined to favour a compulsory examination by specialists before admitting men to the fold.

Sir ST CLAIR THOMSON (London) said that Dr. Mygind's paper again showed how well organized oto-laryngology was in Germany, and how in this country they still muddled on in the old way. But they must accept this country and its ways as they found them; the national habit was to evolve slowly, and he himself had much less faith in examination and legislation than in slow and steady evolution. Dr. Watson-Williams's proposals were ideal, but he asked too much. He himself was not a crusty conservative in this matter; he felt strongly that progress should be pushed on, but that it was best done by their own personal exertion and their corporate life. They could do much by showing that they were neither physicians nor surgeons, but a combination of both; that they were not mere tradesmen; that they were doing sound and scientific work in their schools, hospitals, and medical societies, and that they did not shirk work, either in private or in hospital. They should insist on the importance and dignity of their calling by demanding beds and a proper equipment in the hospitals they were attached to, and by urging the necessity of training and examining all students in oto-laryngology before giving them a diploma. Until they had raised their own standard and dignity, and until they insisted on the absolute necessity of oto-laryngology for all pass examinations, he thought it unreasonable to put forth a demand for a separate and particular examination for a specialist. They must first improve themselves and their work, and the material out of which specialists were made, before they tried to mark them off by examination.

Mr. GEORGE JACKSON (Plymouth) said that he had drawn attention to this subject in the General Medical Council when he was a member of that body. In reports of various examinations it was the rarest thing to have any questions asked in either otology or laryngology. At present examinations were conducted too much on the Chinese system. No one could obtain a diploma in a German university without showing, by production of his notebooks, the work he had done in the various laboratories and clinics. There were great objections to the multiplication of diplomas. Already there were examinations by various bodies for a diploma or degree in psychiatry, so that after a time a man would have to be passing no end of examinations, which would absorb more time than it was possible for the ordinary man to devote to the subject. He could not therefore agree with the introducer of the discussion as to the necessity of a special diploma or degree.

Dr. DAN MACKENZIE (London) said that the subject divided itself into two parts—first of all, the education of the medical student in their speciality; and, secondly, the education of the specialist himself. As regards the former, it should not be forgotten that what he should be taught was to recognize the occurrence of the dangerous symptoms. For example, there were few or no general practitioners who realized the meaning of vertigo in a case of chronic middle-ear suppuration. These were the matters to which the students' attention should be directed, and not to details of treatment or to manipulative measures. With regard to the training of the pure specialist, the speaker, after some hesitation, had arrived at the conclusion that examinations and specialist degrees were unnecessary in this country. There was no great abuse of public confidence by pseudo-specialists in Britain, and until there was they could not approach the General Medical Council with a resolution asking them to make such qualifications compulsory. Turning to the education of the specialist in this country, he agreed with the speakers who said that it was not so poor as Mr. Westmacott had made out. The speaker had participated in the organization of the teaching at the special hospital with which he was connected, and efforts had been made to make this teaching thorough and careful. Of late the classes had been arranged so as to conduct the practitioner from the elementary to the more advanced stages of their art, and, judging from the students who attended, these methods of instruction seemed to be pretty well appreciated.

Dr. WALKER DOWNIE (Glasgow) said that reference had been made by several speakers as to the desirability of including laryngology and otology amongst the compulsory subjects in the medical curriculum. Was it not the case that, by a recent ordinance of the General Medical Council, those two subjects had been placed under the category of compulsory subjects? In Glasgow, where, up till now, attendance on a course of instruction in laryngology had been optional, fully 90 per cent. of those presenting themselves for the degree examination at the university had attended a course of practical instruction in laryngology. Henceforward attendance by the students on a course of instruction in laryngology, and also in otology, was to be compulsory, and so that important point had already been attained.

The PRESIDENT of the Laryngological Section, Mr. Middlemass Hunt (Liverpool), thought that the establishment of paid assistantships or fellowships in connexion with the various clinics throughout the country would enable men to devote a longer time to training themselves before entering on special practice. The short time which many gave at present was largely a question of expense. Men could not get the prolonged training advocated by the openers of the discussion unless they possessed private means. He did not think the examination test was reliable as to a man's fitness for practical work, and he deprecated the multiplication of diplomas and degrees.

Dr. HERBERT TILLEY (London) thought the evolution of the ideal specialist entailed the co-operation of so many factors that one could scarcely hope these would all be secured by any cut and dried curriculum and still less by legislation. He agreed with Sir StClair Thomson that the specialist was born, not made, and for any special line in medicine or surgery to secure the respect of the general profession, those who elected to work in it must necessarily have had a good training in general medicine and surgery, and then by their own good work so advance the knowledge in their speciality that they would command the honour and goodwill of the general profession. Speaking from personal experience, he said that the two to three years which he spent in general medicine and surgery, after leaving his hospital, had proved to be of incalculable value in enabling him to view any special case in true perspective. In University College Hospital, London, each student was compelled to work for three months in the ear and throat and other special departments, so that they, at least, might learn to know how to examine a case, familiarize themselves with instruments and apparatus, and above all recognize the difference between the normal and pathological. It soon became evident to the teacher which of the students had a natural liking for the work or were possessed of manipulative skill, and from these he chose his assistants, who afterwards might give their attention solely to this special work.

Mr. WAGGETT (London) wished to associate himself with Sir StClair Thomson in expressing the view that the genuine expert specialist was made not by diploma but by a process of natural selection, and he thought that the committees which nominated for hospital appointments formed the chief instrument for the advancement of that natural process. The bulk of their work upon the throat and ear was such as could and should be dealt with by any fully qualified practitioner, and it was of the utmost importance that the test in these subjects in the pass examinations should be genuine, just as for a long time had been the case in obstetrics and ophthalmology. If the general practitioner acquired a knowledge of these particular subjects he would see to it that the pseudo specialist would in the future have but little field for practice. It was, therefore, in the education of the medical student, and not in the creation of a fresh "honours" diploma, that the solution of the problem would be found.

Mr. MACLEOD YEARSLEY (London) said that before reaching the ideal of Dr. Watson-Williams much spade work

had to be done and much ground to be prepared. It seemed to him that the question, in this country at any rate, was largely one of evolution, and, if they were to educate adequately those of their students who were to become the specialists of the future, they must begin by training those who intended to be general practitioners only. For this otology and laryngology must be made compulsory subjects and must be included in examinations for qualification. The teaching should be confined to such general principles as would make the student to realize the importance of the specialities and enable him to make a decent diagnosis and know when to seek help. This would not add greatly to the already heavily-burdened curriculum, but it would have the advantage of coming at the best time, when the student's mind was plastic and more open to receive and retain impressions. This would be better than post-graduate teaching, which, in this country, was open only to those who had time and money to devote to it. Once it was appreciated that instruction in oto-laryngology was an indispensable part of the education of a general practitioner, and the necessity for such education was recognized by the licensing bodies, the way for the education of the specialist would become more easy.

Dr. ANDREW WYLIE (London) did not think that several of the speakers understood that the subjects of laryngology and otology were compulsory in the medical curriculum, and therefore those laryngologists who did not get a proper position in their hospitals should demand it. The teaching of the special subjects in London and, he hoped, in the provinces was excellent—in fact, superior to that abroad. Their clinics were excellent and their material ample. He personally had not found better clinics either in Berlin, Vienna, or Paris, but in this country they were very defective in their pathological departments. This defect was due to their being handicapped by neurotic Governments. *Post-mortem* examinations should be compulsory on all cases in which the surgeon desired them.

The PRESIDENT of the Otological Section, Mr. Hugh Jones (Liverpool), agreed with Mr. Woods that the training of the eye and hand were of very great importance.

REPLIES.

Dr. MYGIND, in his reply, said that it had been his experience that the practical education of the specialists in oto-laryngology in many English polyclinics was excellent, and many foreign specialists had, like himself, received an important part of their education here. If there were serious defects to mend, he thought it important to begin reform work in the education of the student.

Dr. WATSON-WILLIAMS expressed his gratification at the unanimity of opinions elicited on the more important matters submitted for discussion, although on some points in his paper some misapprehension had arisen. Dr. Permewan had summarized in one sentence the purport of his opening remarks—namely, that the specialist should be placed on the same footing as the physician and surgeon. The question of having a distinctive qualification required further consideration, and indeed was a minor matter compared with the importance of ensuring full and systematic training. But at the present moment the University of London, for instance, enabled its graduates to take their further and full degree in many special subjects—namely, State medicine, gynaecology, mental diseases, pathology, odontology—and the principle might be extended to their own special branches. At any rate, in this country the only way of getting regulations laid down governing a course of study was through a university or other corporate body granting degrees or diplomas. It had been suggested that requiring five years to elapse after qualifying for practice before the distinctive qualification of a specialist was conferred would involve the candidate in too much expense. But he would point out that if the tentative suggestions he had made were adopted the candidate would still have the same opportunities for practice as he had now, and he could pass all his examinations, if he wished, two years only after becoming qualified. He (the speaker) felt, however, that it might be advisable to ask for fuller clinical experience, and, after all, it was not so very unreasonable to expect general medical and surgical experience, and the acquirement of a masterly knowledge of the speciality should extend in all to five years before a practitioner obtained a specialist's highest qualification, particularly if scientific research and investigation was to take the place of examination.

Dr. BIRKETT said that he was delighted to learn from the reading of the papers that there existed a unanimity of opinion regarding the foundation work of the future specialist. He felt that the fundamental principle in the education of the specialist was the medical education of the student himself. Regarding the opinion expressed against legislation, it must be borne in mind that this was only meant to apply to Canada, and the idea was to protect the profession against those individuals of good standing who saw fit to enter this special field of work by an extremely short route.

SECTION OF OTOLOGY.

Mr. HUGH E. JONES, M.R.C.S., President.

PRESIDENT'S INTRODUCTORY REMARKS

IN welcoming the members of the Section, the President called attention to the subjects which had been set down for discussion, and pointed out that the keynote of them all was *prevention*—the prevention of deafness or the prevention of the sequelae of acute otitis media. In the latter discussion it was interesting to them to have the collaboration of a fever man. He wished to take this opportunity to advocate some sort of scheme for forming a collection of material upon which young otologists could work. The committee of the Royal Society of Medicine were considering this question. It was of the utmost importance that every young otologist should have material to work on. He wished to extend a particular welcome to their visitors from overseas who were attending the work of the Section.

DISCUSSION ON ACUTE SUPPURATIVE OTITIS MEDIA, ITS NEGLECT AND PROPER TREATMENT.

OPENING PAPERS.

I.—ROBERT H. WOODS, M.B., F.R.C.S.I.,

Surgeon for the Throat, Nose, and Ear to Sir Patrick Dun's Hospital, Dublin.

WHEN speaking of acute suppurative otitis media, or, as it is still frequently called, acute abscess in the middle ear, it is well to remember that we are dealing, not with a true abscess, but purulent inflammation of an epithelial tract of a highly specialized nature, and following a complex course, in the middle of a dense bone.

It is safe to say that nearly, if not quite, all middle-ear inflammations result from direct infection by continuity of tissue from the naso-pharynx along the Eustachian tube. Time does not permit that I should say anything about determining causes.

Otitis media may be of any degree of severity. The variety of the microbe, its virulence, and the power of resistance of the patient, form three factors capable of producing effects that may vary from a hardly discernible blush, slowly entering, and, after many days, modestly retreating, to a fulminating blaze that disorganizes the organ of hearing within a few hours.

Whatever cause may have started the infection, the clinical course pursued by the disease is for all purposes a constant one, varying only in one highly important respect—namely, severity. This severity is invariably directly proportional to the rapidity of the onset.

The first effect is to produce an erythema of the petrous epithelium, including under that term not only the tympanic cavity and membrane, but an indefinite amount of the mastoid cells. As the process advances, the next effect of note is that the outer end of the Eustachian tube where it lies in the bony canal becomes choked. Air is now no longer supplied to the tympanic cavity; there is

nothing to compensate for the air absorption by the walls, more active now than normally on account of the dilatation of the vessels, a negative pressure is established in the cavity, and the membrane becomes retracted. The effect of this negative pressure is to superpose on the active hyperaemia of the inflammation a passive one, which, according to the doctrine of Bier, must be beneficial. This retraction, however, is only observable in very slow cases, and may be regarded as absent in the more rapid ones. Serum exudes from the epithelium into the cavity, the negative pressure is relieved, the drum reverts to its original position, and, finally, a positive intratympanic pressure is established, the membrane being bulged out towards the meatus. The positive pressure tends to cause a passive anaemia of the walls, which to some slight extent counteracts the active hyperaemia, and must therefore be regarded as a bad influence, helping the invasion by suppressing the inflammatory process by which that invasion is combated. As the secretion of the fluid continues, one or other of two things must happen—either the fluid leaks slowly away through the Eustachian tube, or if, as is the rule, the choking is too complete to permit this, the intratympanic pressure increases until rupture of the membrane relieves it by giving exit to the fluid into the external meatus.

The two most common accompanying symptoms of this process are pain and fever, their degree depending on the acuteness of the attack. These should abate, or entirely subside, when rupture takes place.

It must be borne in mind that, varying with the severity of the attack, the length of time occupied by this sequence of events varies within wide limits. Days may be occupied in approaching any given stage; matters at that stage may come to a halt, and the process subside again, leaving the patient none the worse. Or, on the other hand, the whole category may be gone through in a few hours. I have seen a tympanic membrane appear perfectly normal one morning, and on the next found it, not merely perforated, but destroyed. These fulminating processes are only met with in acute febrile disorders, especially measles and scarlatina.

If we examine the fluid shortly after rupture of the membrane, though it may occasionally contain flaky muco-pus, we usually find it of a serous character, showing but few bacteria, and not many pus cells. It does not appear to matter much whether rupture takes place soon after the beginning of an attack, or is delayed for days by its mildness, the character of the fluid is, except in the fulminating cases, generally the same. In a day or two the serous fluid changes to muco-pus, showing large quantities of bacteria and pus cells under the microscope. The discharge, then, if the case is left untreated, persists an indefinite time, and may, when subsequently examined, be found to contain bacteria of many kinds; and according to the length of that time it is classified in the old and useful, if somewhat inaccurate, way, of acute and chronic.

The question as to what is the essential difference between an acute and a chronic otitis media is one of the highest practical importance. Why is it that, of a number of cases beginning in precisely the same way, and apparently due to the same cause, some should heal kindly enough, and others persist to imperil the patient's life?

In other words, what constitutes chronicity in otitis? The view most commonly held is that the difference is one of degree. That, owing to some defect in the patient's defence, the infection which originally started the otitis obtains in some cases a firmer and more deep-seated hold than in others. That, after the first flush of resentment on the part of the body, a kind of truce is established in which tolerance of the invaders is, as it were, set off against their active hostility. That, in other words, it is an arrangement come to without any third party intervention between the invaders and the body invaded. That the pathological tissue changes associated with chronicity which form the entrenchments behind which the invaders find themselves sufficiently strong to exact such terms, are a first effect of the struggle. There is much to be said for this view, particularly if we allow—as indeed we must—that such effects as necrosis of the ossicles may take place within a few hours of the start of the process. But, in addition to permanent pathological tissue changes in the tympanic cavity, acute and chronic otitis differ from one another in the character of the discharge. Acute otitis usually has but a single type of bacterium present, while in chronic otitis one commonly finds a variety of forms of micro-organic life. On the view of its nature above expressed these are the effects of chronicity; and it is true that, if chronicity is once taken for granted, the wonder would be if the discharge remained a pure culture.

It is now sixteen years since this subject first engaged my serious attention. I was at that time attached to the Hardwicke Fever Hospital. As a result of my work there, I concluded that this view of the nature of chronicity was not correct. My experience since that time confirms me in that belief. I believe that the bacterial contrast between acute and chronic otitis is no mere accident, but that it constitutes, or at any rate causes, the fundamental and essential difference between the two classes; that an acute otitis is caused by one organism, a chronic by several; that every otitis is acute to start with, and only becomes chronic as a result of direct infection from without at some moment in the history of the case after rupture of the membrane; that the original infection, if not aided and abetted, subsides like an acute cold in the head as the virulence of the microbe decreases and the resistance of the patient mounts. If, however, in the course of an acute otitis the discharge lying in the external meatus becomes contaminated with casual dirt, it is inevitable that new infections should spread through the warm and moist pabulum to the tympanic cavity and its adnexa, and that many varieties of organisms should be introduced where only one existed originally. These then prolong the process; and, even admitting that some of them may be combated and destroyed, it will not happen to all at the same time, and is not likely to happen to saprophytic organisms at any time. There will always be some left to carry on the evil work until, as always happens when epithelium lies long in contact with pus, degeneration takes place, a cultivated tolerance of the invaders is induced, and true chronicity is established.

If this view is correct, it should follow that chronicity is a preventable condition, and if chronicity can with certainty be prevented on this assumption it is strong proof of its truth—in fact, the only possible proof. Both these propositions are in my judgement and experience quite true.

As already mentioned, being greatly impressed with the ravages made by chronic suppurative ear disease, especially in connexion with acute specific fevers, I in 1896 undertook an investigation into the matter during an epidemic of measles and scarlatina in the Hardwicke Hospital, Dublin. In five months I had watched considerably over 300 cases. In every case a daily examination was made and the condition of the ears noted. The first 100 cases or so were only observed. No interference was made with the treatment, or rather want of treatment, then in vogue. My reports are to be found in the *Dublin Journal of Medical Science*, January, 1893. Though I have—as is, perhaps, not unnatural—modified some of the views I then expressed, my main conclusions were, I believe, correct.

I observed that most of the cases followed clinical courses precisely parallel with the ordinary otitis media from so-called "cold," some advancing to a certain point and subsiding again without necessarily suppurating, others, after an indefinite time, ending in a rupture of the membrane, which might heal kindly enough after discharging for a week or two. But I also saw a considerable minority of cases where destruction of the membrane took place—a phenomenon not met with in ordinary otitis. In all such cases the destructive process was amazingly rapid, occupying at most only a matter of hours. In all cases microscopically examined only a single organism was found immediately after discharge appeared. For all these reasons I therefore concluded that the otitis of scarlatina, of measles, and of the ordinary acute variety, were all essentially the same process, and that the destruction of the membrane was only the effect of bacteria of exceptionally high virulence in a patient whose resistance was exceptionally low.

I further concluded that the essential difference between acute and chronic otitis media is that between monosepsis and polysepsis, and gave it as my opinion that:

It requires, in an ordinary case, little more than elementary cleanliness in order, by preventing this epi-infection, to ensure

that the inflammation may subside and the membrane heal in a few weeks, leaving the patient little, if any, the worse in health or hearing.

I then recommended the following routine treatment for the ears in all cases of eruptive fevers: "On admission every patient's ears are to be cleansed by syringing with carbolic lotion 1 in 60. If suppuration occurs the discharge is to be removed by syringing twice daily, or more frequently if profuse. Boric powder is then to be insufflated or boralcohol instilled." These recommendations have ever since been carried out in the Hardwicke, with what results I shall let the present physicians to that establishment speak.

Dr. J. B. Coleman, C.M.G., writes me on May 9th, 1912:

> Since the epidemics of measles and scarlatina during the winter months of 1896-7, during which you made a daily examination of the ears in the Hardwicke Fever Hospital, I have followed the lines of treatment recommended by you with the most satisfactory results. In *all* cases early and systematic cleansing of the external ear passages is carried out. In cases in which suppuration occurs it subsides rapidly under treatment with gentle syringing with alkaline lotion, followed by instillation of boric alcohol drops. Of late years I cannot call to mind a single case in which the patient left the hospital with the ears "running." No later than last week I pointed out this fact to the students, and, on appealing to an experienced sister in the ward, she corroborated my statement.

Dr. O'Carroll, Senior Physician, endorses Dr. Coleman's statement as to results, and adds the interesting clinical point, that while in measles patients generally give the attendant some reason to suspect when the ear is becoming involved, in scarlatina they are so sick and sore about the throat that no complaint is made, and the discharge appears without premonitory symptoms.

Even an *advocatus diaboli* would hardly assume that the great number of cases, averaging hundreds annually, treated in a large fever hospital like the Hardwicke of late years have been different in type or that the improvement in their ear lesions was due to some accident outside the treatment. The conclusion is forced on one that the great change wrought in these patients since the treatment above referred to was adopted, is proof of the correctness of the theory on which that treatment was based.

Whilst the change from monosepsis to polysepsis must be regarded as the cause of acute otitis becoming chronic, it must not be forgotten that it is possible for a single infection to be chronic from the first. Acute necrosis of the ossicles and tuberculous disease are both examples. But they are rather illustrations of the ambiguity of the term "chronic" than exceptions to the rule just now laid down. Of the former we can say that effects of such severity are rare, and are not connoted by the term "otitis media," and that it is really an acute monoseptic infection complicated by the presence of a foreign body, the necrosed bone. As to the latter, tuberculous otitis is never acute. If it were it would have a better chance of curing itself. The essential reason for the chronicity of tubercle is that it excites little or no resentment in the invaded tissues, and the defensive powers of the body are not called into play with sufficient vigour to beat off the infection. We may proceed a step further, and say that if an infection is acute (that is to say, of a kind that excites the resentment of the tissues as evidenced by inflammation) there is a strong presumption that, in a fair stand-up fight between the invaders and the protective mechanism of the body, it ought not to become chronic, and that if it does so the "ring" has not been fairly kept. Of course, an infection may be mixed, and this will contribute to its severity, but ought not to determine its chronicity unless we assume it to be *ab initio* polyseptic within the meaning of the term as applied here.

Any tendency, therefore, to regard things as at their worst when pus appears must be combated. Though it is true that the ear is septic, and

> All the king's horses and all the king's men
> Cannot make the organ aseptic again,

we can prevent it from becoming polyseptic, and one devil is preferable to seven. This, then, should be the keynote in all treatment in acute otitis—to recognize that the process is initially a monoseptic one, and that the one thing necessary to bring about a cure, or rather to permit cure, is to prevent polysepsis.

It will be sufficient to indicate in the broadest way how this should be done. First, the discharge should be removed from the meatus by efficient syringing with sterile water, if slightly alkaline so much the better, as the muco-pus will come away somewhat more readily. This may be repeated as often as the discharge appears at the external meatus, but three or four times a day is usually enough. After careful syringing the ear should be dried. Then—twice daily—after syringing and drying, the meatus should be filled with some antiseptic, either in the form of a lotion, or a powder, such as boric acid. Personally, I use boralcohol, which is a saturated solution of boric acid in 40 per cent. to 45 per cent. alcohol. There is only one drug commonly prescribed as an ear lotion against which I have a prejudice, and that is peroxide of hydrogen. This, if used in any but the mildest strength, is apt, by infiltrating the tissues and then liberating its oxygen, to cause a surgical emphysema, which may lead to dangerous dissemination of the infection. Children have a great tendency to put their fingers in their ears when they feel discharge there. I believe this to be a most fruitful cause of polysepsis, but the danger may be averted by tying a cotton or linen cap over the auricle.

As to the management of acute otitis media: In mild and slowly progressive cases, characterized by little or no febrile disturbance, slight pain, with injection along the handle of the malleus, and without bulging of the membrane, it will be sufficient to keep the patient in an even temperature, administer a purge, and for local treatment apply moist heat, either by Leiter's tubes covered with moist gauze, or by the more homely and equally efficient method of getting the patient to hold the ear for a quarter of an hour or so over a large jug of boiling water, the mouth of which has been covered with several layers of flannel.

The application of warmth is always soothing to pain, and to this is no doubt due the popularity of instillations of warm oil in the ear in such cases, but the principle of putting any decomposable material into a meatus where discharge may subsequently appear is obviously a wrong one, and is inexcusable when an effect as good, if not better, may be had by the more cleanly methods already indicated. If, however, warm drops are demanded, glycerine and water in equal parts may be used. This fluid will not decompose, and its influence is in the direction of antisepsis.

I do not think there is much, if any, advantage to be gained by administering drugs, but sodium salicylate and its derivatives are popular remedies, and there is not much to be said against them.

If the membrane is bulging, myringotomy should at once be performed by a linear incision behind and below the handle of the malleus. In strong-minded adults this may be done without a general anaesthetic; no local anaesthetic yet devised renders an incision into an inflamed membrane painless. But children, and those who shrink from even a momentary pain, should be put to sleep; nitrous oxide is quite suitable. The operation is both simple and safe, and only needs proficiency enough in the use of the forehead mirror and speculum to be able to see what goes on.

When exit has been provided for the intratympanic fluid the course of acute otitis is a simple and perfectly definite one. The pain subsides and the temperature drops in a very short time, at most a few hours. But if this does not happen it ought not to be taken for granted that the wound in the membrane is too small. Valuable time is sometimes wasted in repeating myringotomies. It ought rather to be assumed that the tympanic cavity is not the part of the temporal bone chiefly affected. If the mastoid is oedematous, this will of course be obvious, but the assumption should be made irrespective of whether the soft tissues over the mastoid process show signs of inflammation or not. The next step should be to open up the mastoid antrum, and see that proper drainage is provided. Diploitis should be followed, and if doubt exists as to the health of the meninges, the middle and posterior fossae should be opened—a perfectly safe procedure if no violence is done to the dura. For reasons above indicated, if not as a matter of ritual, the operation and subsequent dressing should be carried out with scrupulous technique. Complete healing, both of the membrane and of the wound, may in such a case be expected in a week or two. The radical operation should never be undertaken in a monoseptic case.

In acute otitis media intracranial complications are rare, but when they happen they generally assume the hopeless form of acute diffuse leptomeningitis.

In children with acute otitis there are frequently symptoms of cerebral irritation, which subside when the membrane ruptures or is incised. How far such symptoms are due to local extension of the inflammation is a doubtful point. There can be no doubt that one factor contributing to intracranial extensions is a positive pressure of infected fluid in the tympanic cavity, and for this reason, if for no other, early myringotomy is indicated in every such case.

In conclusion, let me say the proper handling of uncomplicated otitis in acute fevers ought to be as much a matter for clinical physicians as for otologists, but I fear that their education in the subject, as well as that of the practitioners they are helping to turn out, still leaves much to be desired.

II.—Claude Rundle, M.D.,

Superintendent, Fazakerley Hospital, Liverpool.

Those of us who have to deal with acute suppurative otitis media occurring in the course of the exanthemata have to confess that the measures which they employ for the treatment of this condition are largely palliative or expectant. We are agreed that a complication so fraught with danger to the subsequent welfare of the individual should have the advantage of any operative or therapeutic measure which you may commend to us, and it is with this object in view that I have accepted your invitation, Sir, to take part in this discussion.

One word as to the frequency of otitis media in the course of the exanthemata. The proportional incidence in all cases of scarlet fever in the Fever Hospitals of the Metropolitan Asylums Board is 15 per cent., at the Liverpool Fazakerley Hospital 9 per cent. The more favourable result obtained at the latter hospital is, in my opinion, entirely due to the absence of routine throat and nose treatment during the acute stages of the disease. Again, of 85 cases of otorrhoea occurring among scarlet fever patients at the Fazakerley Hospital during the year 1911, 70 had undergone spontaneous recovery, with a complete cessation of the discharge for a period of at least fourteen days before leaving hospital. The corresponding figures for measles are 15 and 12 respectively. These facts are of interest in view of the demand for post-nasal and tympanic interference made by Knyvett Gordon and others. Permit me to say at once that I employ no routine measures for the treatment of acute suppurative otitis media occurring in the course of the exanthemata, either therapeutic or operative, other than those to which I refer subsequently. Intratympanic medication, by either route, has not justified the trouble which it entails, and comparative returns suggest that routine syringing may even prolong the course of the subsequent otorrhoea.

The methods of treatment at our disposal fall under three headings:

1. Palliative.
2. Operative.
3. Therapeutic.

Palliative treatment I need not refer to, except to remind you that ear trouble in the course of the fevers has usually a painless onset and that paracentesis is rarely called for.

Operative interference may be considered under two headings—first, the removal of tonsils and adenoids; secondly, operations upon the mastoid bone. I am strongly of opinion that removal of post-nasal obstruction by surgical interference during the early stages of one or other of the infectious diseases of childhood is a totally unjustifiable procedure. Virulent strains of streptococci are present in the faucial and pharyngeal tissues of all cases of scarlet fever, and the Klebs-Loeffler bacillus is to be found in at least 20 per cent. of them. I cannot think that we are justified in deliberately offering a large extent of raw and injured surface to the purposes of these organisms. Removal of tonsils and adenoids is occasionally required for the relief of dangerous obstruction to respiration in the early stages of the fevers, but should, I think, be never undertaken, either as a measure of prophylaxis or treatment, in regard to acute otitis media complicating the first few weeks of scarlet fever.

I am anxious to hear your views more particularly as to the proceeding which you would recommend where acute otitis media supervenes late in the course of scarlet fever—that is, when active throat trouble has subsided. Would you at this stage advise the immediate removal of tonsillar and post-nasal obstruction, or would you postpone this procedure as a measure for the cure of subsequent otorrhoea? Having in view the frequency of spontaneous recovery and the undesirability of surgical interference with the pharyngeal tissues during the course of the exanthemata, my practice is to undertake removal of adenoids and tonsils only in those instances where patients cannot be relied upon to continue under the observation of an aural surgeon after discharge from hospital.

It is probably agreed that retention of pus in the antrum in this condition indicates the necessity for antrotomy—that is, Schwartze's operation—or, as an alternative, the operation of Heath. I have had no experience of the latter procedure. I personally never perform the radical mastoid operation in the acute stage of otitis media unless signs are present of intracranial disease. Simple incision of the mastoid is all that we are justified in doing, unless a route is required to guide us to the source of the intracranial trouble. When, on the other hand, mastoid complications supervene upon an otorrhoea of some weeks' standing, then I think it is incumbent upon us to perform the complete operation.

Horse serum—preferably diphtheria antitoxin serum—has, I think, a distinct value in otitis media complicating the acute stages of the fevers. It is difficult to exclude the factor of coincidence in these cases, but there can be no question that a marked improvement in the degree of pharyngeal inflammation is the immediate result of the injection of sufficiently large doses of serum, and I am of opinion that the muco-periosteum of the middle ear and antrum shares in the partial immunity obtained. Where acute suppurative otitis media is the result of direct extension through the Eustachian tube, and is associated with an infective inflammation of the pharyngeal tissues, it is my belief that the free exhibition of serum is of greater value than the combined effects of other measures.

The preparation of an autogenous vaccine from a discharge presenting so complex a flora as that met with in otorrhoea is a matter of some difficulty. My experience of "stock" or autogenous vaccines has not encouraged me to continue their use.

III.—Herr Professor Dr. Gustav Alexander,*

University of Vienna.

(Abstract.)

Etiology and Anatomy.

As regards the etiology of otitis media, Professor Alexander said that all the exciting causes of suppuration had been found sometimes in pure culture and sometimes in the form of a mixed infection.

In all cases in which the tympanic cavity was infected through the tube the mucous membrane first swelled so as to cause obstruction of the tube; the swelling thence spread over the membrane of the middle ear and the tympanic membrane. The middle ear, the attic, and the antrum, and in many cases the air cells of the mastoid became filled with a viscid exudate. Later suppuration set in accompanied by a massive exudation into the cavities of the middle ear. Finally the pus broke through the tympanic membrane, and escaped externally. At the end of a week, as a rule, the secretion of pus became mixed with mucus; more mucus and less pus would be secreted, and, finally, in a few weeks, complete resolution would have occurred.

Symptoms.

The most prominent at the beginning of the disease was a sudden violent pain in the ear. The patient became restless and could not sleep. Deafness was pronounced at first, but in uncomplicated cases hearing would return to the normal at the end of the disease. As a rule fever would be found at the onset, but this would subside with the perforation of the membrane.

Otoscopical examination would reveal swelling and redness of the membrana tympani, either the whole membrane

* This paper was read, in the absence of the author, by Mr. W. M. Mollison, M.S., F.R.C.S.

being involved or only a portion of it. The extensive formation of vesicles might also be observed. A perforation might be expected when a circumscribed yellow point was seen on the membrane coupled with very marked bulging. Sometimes after removal of the secretion it would be impossible to see the site of a perforation, but it could generally be recognized by watching the spot whence any further secretion came or by aspirating with Siegle's speculum. The size of the perforation was variable, being widest in the fulminating type of the disease met with complicating the exanthemata, particularly scarlet fever.

Diagnosis.

Diagnosis could usually be made without special difficulty in the first stages of the disease from the symptoms and otoscopical examination.

Professor Alexander then entered fully into a description of the usual course of the disease and the variations in that course which might be encountered, together with a detailed account of the more common complications. He continued: If the acute otitis were not treated the dangers of pus retention and its consequences would have to be reckoned with. The pus became stagnant, and this led to eczema of the auditory canal and inflammatory swelling of the lining of the meatus, besides granulations round the margin of the perforation which blocked its free opening. There was no doubt that on this account some cases of purulent mastoiditis were caused mechanically by the stagnation of pus in the cavities of the middle ear. The pus might exert considerable pressure on the walls of the tympanic cavity till finally the tegmen became involved and an extradural abscess and meningitis resulted. In other cases pressure was particularly great on the lateral wall of the labyrinth, so that spontaneous nystagmus and even vertigo were observed.

If suppurative otitis media were neglected the hearing was always greatly diminished, and would remain so even after healing. Frequently a long catarrhal stage followed the spontaneous healing of a neglected case. Organization of the middle-ear exudate was followed by the formation of connective tissue bands; the chronic adhesive process thus set up caused degeneration of the organ of Corti and a consequent labyrinthine deafness.

Treatment.

He confined himself in the first stage to a purely symptomatic local treatment. Violent earache could often be considerably alleviated by instillations of 3 to 5 per cent. carbolic glycerine. With a wide auditory canal, where there was no fear of stenosis from epithelial maceration, one might also instil warm (40° C.) solution of aluminium acetate. Instillations of cocaine, novocain, and alypin were good, but the effects merely temporary. The local application of cold—for example, ice-bag, Leiter's tubes—was to be recommended during the early stages, whereas he found haemagogues of no help. He always ordered rest in bed and a good evacuation of the bowels, whilst alcohol, strong coffee, and tea were forbidden. If the pain and fever were intense it was advisable not to wait for spontaneous perforation, but to undertake paracentesis at once. For this purpose he made use of the lance-pointed needle mounted on Politzer's handle. He made his incision as long as possible close behind the umbo, unless there were indications of an immediate spontaneous perforation, when the paracentesis should be done in that spot. Paracentesis was indicated when conservative measures failed to give relief. There should be no hesitation in performing the operation, and it was better to do it in doubtful cases than to delay doing it. If such aseptic precautions as the ear would allow were observed there was no danger in the operation, whereas delay might lead to even fatal complications. For anaesthetizing purposes he recommended a novocain adrenalin solution (1 c.cm. of 20 per cent. novocain or alypin solution heated to 40° C. mixed with five drops of the ordinary adrenalin solution, also previously warmed). The fluid should be left in the external auditory canal for ten to fifteen minutes. As an alternative instillations of 5 to 10 per cent. aqueous solutions of cocaine with five drops of adrenalin solution (1 per cent.) could be recommended.

If pure pus were evacuated through the paracentesis wound it suggested that the operation had been left till too late, and that already there was a condition of acute empyema of the middle ear. Immediately after the operation he introduced strips of gauze which had been previously dipped into a warm solution of aluminium acetate or 1 per cent. alsol into the auditory canal without previously washing it. A damp dressing was then applied to the ear, and the patient put to bed. In favourable cases a profuse purulent secretion from the external auditory canal should be observed within the next few hours, and there would no longer be any pain. Within three to five days the temperature would return to normal.

If the perforation were situated at the top of a nipple-like protuberance of membrane, the opening would sometimes become temporarily agglutinated, and signs of pus retention would result. The nipple-like projection must then be well opened again with the paracentesis needle.

There were a number of different ways to avoid retention and stagnation of the pus. Very successful were damp dressings of aluminium acetate or 20 per cent. alsol, renewed every twenty-four hours. A damp strip of gauze was inserted into the external auditory canal, and would generally at the end of twenty-four hours be found infiltrated with pus. Absorbent gauze strips or strips impregnated with antiseptics might be employed. The gauze strips might be changed by the persons in attendance on the patient, using small forceps which had previously been sterilized. The strips should be renewed at regular intervals according to the amount of the secretion. Pus must not be allowed to accumulate behind the gauze strip. He considered that syringing was only necessary if the secretion were ropy and thick; he used sterilized water at 38° to 40° C. The insufflation of antiseptic powders was entirely superfluous when secretion was copious.

The gauze strips were an advantage, as the progress of the patient could be observed without a daily visit. Normally by the end of the first week the secretion should have become ropy, and the gauze would then no longer suffice. He then advised the application of hydrogen peroxide (3 to 6 vols. per cent.) to the ear two or three times a day. Pus could be removed from the tympanic cavity two or three times a week by politzerization and subsequent cleansing of the auditory canal with wool tampons soaked in perhydrol. The blowing in of air caused rapid improvement in the hearing.

Special care should be taken in treating the external auditory canal, as an eczematous condition would increase the purulent stagnation in the middle ear. In the latest stages he advised daily politzerization until the hearing was permanently good. The gauze he kept in till the perforation was entirely closed, which generally occurred within a few days of the cessation of the purulent secretion. It was advisable to keep the external meatus closed with a pledget of cotton-wool for some weeks after the healing of the disease.

The prevention of subsequent attacks of otitis media was best ensured by maintaining a free passage through the posterior nares and naso-pharynx and restoring the normal condition of the pharyngeal tubal orifice.

As regards the treatment of otitis at the age of suckling, it was essentially the same as at a later age. Early paracentesis was important, as otherwise one might be surprised by the early and spontaneous onset of a severe cerebral complex of symptoms (meningism), or even by purulent meningitis. Free drainage through the external auditory canal must be carefully attended to. He recommended frequent paracentesis if the case ran a prolonged course. Exuberant granulations must be removed. When the otitis had subsided, it would frequently be necessary to remove the tonsils and adenoids.

Professor Dr. Alexander then communicated the results of some experiments conducted by Dr. G. Dintenfass, of Vienna, on the use of urotropin in suppurative otitis media. He said:

Bearing in mind the intimate relationship between the subarachnoid space and the lymph spaces of the ear, Dintenfass gave urotropin to patients suffering from purulent otitis in various stages, and tried to recover urotropin or one of its dissociation products—formaldehyde—from the ear discharge; 0.5 gram (7½ grains) of urotropin were given four to six times a day by the mouth, and the discharges were collected in sterile glass tubes and

examined. In the majority of cases it was possible to demonstrate formaldehyde in the discharge from the ear. In all, 90 cases were examined. The conclusions arrived at were:

1. That in chronic suppurative otitis media a fetid purulent secretion became non-fetid within two or three days, except when necrosis of bone was present. The quantity of the discharge diminished quickly. In many cases eight days were sufficient to stop all discharge of a purulent nature. If no effect were noted after one week of treatment, it was best to stop it at once.

2. That in acute otitis media the duration of the purulent stage was greatly shortened, so that the course of the disease was hastened by 50 per cent. In recurring middle-ear inflammation, the attacks were also shortened considerably, and in the exanthemata the prophylactic administration of urotropin was very useful to prevent ear complications if started as early as possible. In all cases large doses must be given—2 to 6 grams had been given without ill effect. Children required ½ gram doses twice daily, adults four to six times daily. If the purulent discharge became serous the drug might be stopped.

No effect was noted in suppurative wounds after the radical mastoid operation.

Before mastoid operations urotropin might be given for prophylactic reasons (against post-operative meningitis). He also recommended its use in cases of meningitis of otitic origin.

He had found autogenous vaccines of more use than the stock vaccines. In no case could they be used as a substitute for operation. They simply had their place as part of the post-operative treatment.

DISCUSSION.

Professor HOLGER MYGIND (Copenhagen) said that opinions as to the proper treatment of acute otitis media had always been different, perhaps principally because the vast majority of cases of this disease recovered completely without treatment. According to the speaker's experience, which extended over a long period, the inflammation of the tympanic cavity might be stopped at its first stage by putting the patient to bed and making him perspire. As soon as the posterior part of the drumhead bulged forward a large incision ought to be made, and this little operation was better done too frequently than limited—as Piffl had advocated—to rare cases. As soon as the drum was perforated, the speaker had for many years used only the introduction into the auditory meatus of a sterilized plug of cotton. The patient was then advised to remove the plug as soon as it was soaked with secretion, and apply a new one with a sterilized instrument. He had collected a great number of cases, and proved statistically that patients recovered more quickly and suffered less from complications when treated by this method than by the instillation of antiseptic fluids or syringing.

Professor WM. L. BALLENGER (Chicago) was much interested in Mr. Woods's presentation of the cause of acuity and chronicity. Though chronic inflammation was attended by polybacterial flora, it did not necessarily follow that this was the cause; it might be a phenomenon incidental to some pre-existing condition which was the predisposing cause, the mixed infection being an accessory cause. He had observed in nasal infection that if there was no obstructive lesion the inflammation was usually acute, whereas if obstructive lesions were present the inflammation tended strongly to become chronic in type. The same principle applied to otitis media. The chronicity depended not only upon the polybacterial flora, but also upon a greater degree of Eustachian obstruction from enlarged and inflamed adenoids. As to the treatment, a 10 per cent. solution of carbolic acid in glycerine dropped into the meatus daily would in the first or catarrhal stage abort the process. If there was bulging of the membrana tympani incision must be performed. After purulent discharge was established he placed a small strip of sterile gauze into the meatus, the distal touching the perforation, the proximal end in the concha. The gauze should not be folded in the meatus, as that would interfere with drainage, and drainage at this stage of the disease was of prime importance. Personally, he employed the dry method of treatment. The meatus was mopped with several small cotton-wool applications, or until the cotton remained dry. He then inserted the gauze strip or wick, renewing it while the discharge was profuse two or three times daily, after that once daily. He used no powders or liquids. He occasionally resorted to measures calculated to promote the reactions of inflammation. If, as Adami had shown, the reactions of inflammation were (*a*) increased hyperaemia, (*b*) increased nutrition, and (*c*) increased leucocytosis, they were physiological processes excited by bacterial stress, for the purpose of overcoming the bacterial invasion. Unfortunately, the reactions were usually inadequate, hence it became their duty to use such measures as would promote the reactions of inflammation, and thus abort the bacterial activity. Among the measures useful for this purpose were leeches, artificial leeches, scarification, counter-irritation, heat, etc. Leeches had frequently been of the greatest value in aborting an early otitis and mastoiditis.

Mr. ADAIR DIGHTON (Liverpool) could not agree that at the present time myringotomy in every case of acute otitis media with a bulging drum membrane was necessary. Recently he had treated a number of these cases by painting the Eustachian tube, under the guidance of the nasopharyngoscope, with a weak solution of silver nitrate, and had found this equally satisfactory, as one painting usually had the desired effect of relieving the pain and terminating the disease. If one painting was not sufficient he had found a second painting all that was required. As to Mr. Woods's treatment in cases that had perforated, he would like to suggest that by means of dry cleaning of the ear with cotton-wool mops, and placing the patient in such a position that he lay upon the diseased ear, drainage by means of gravity was favoured. All the good results of cleansing and drainage were thus retained with none of the obvious dangers of syringing a discharging ear. He had had a splint constructed for the purpose of compelling the patient to lie upon the diseased side, which so far had yielded very good results. He thought that the postural treatment was only common sense, as in the position of the patient on the diseased side all pus would drain by gravity through the perforation, and would leave the mastoid antrum unaffected. Also there would be less danger of a unilateral otitis media developing into a bilateral otitis media by extension via the Eustachian tubes and nasopharynx, as would be likely to happen if the patient were allowed to be on the healthy side with the diseased ear uppermost.

Dr. WM. MILLIGAN (Manchester) said that he fully endorsed Mr. Woods's statement to the effect that acute suppurative otitis media was a monomicrobic infection, whereas in chronic conditions a variety of organisms were present. A mixed infection he therefore considered to be evidence of chronicity. The underlying idea in the treatment of acute suppurative otitis media should be the provision of free drainage with a minimum amount of interference. The principle of physiological rest to the inflamed organ should not be lost sight of. He was an advocate of the performance of an early paracentesis the moment objective evidence of bulging of the membrana tympani appeared. He agreed with Professor Mygind that it was better to perform a paracentesis too early than too late. He had never seen any damage by a paracentesis, whereas he had seen a great deal of damage done from the want of one. He was in favour of dry dressings, as he considered the tissues, when suppurating, were already in a waterlogged condition, and therefore the use of fluid remedies tended to increase the already existing oedema. A continuance of discharge for any length of time after the provision of free drainage he considered to be evidence that the posterior end of the middle-ear cleft was infected. This might be entirely unaccompanied by any evidence of tension or of external indications of mastoid disease—in other words, the antral mucous membrane was infected and required the same free drainage as had already been provided for the cavity of the middle ear. Under such circumstances, he was strongly in favour of the performance of a simple opening of the antrum to drain the posterior end of the middle-ear cleft. He regarded this operation as an extremely important one, not only with the idea of cutting the disease short, but also of preserving audition. He could not see what possible effect

painting the naso-pharyngeal end of the Eustachian tube with nitrate of silver could have. The inflammatory process in these cases invaded the whole tubo-tympanic axis, and for practical purposes the Eustachian tube was sealed up as the result of swelling of its mucous membrane.

Dr. Kerr Love (Glasgow) thought the principles on which treatment should be based were apt to be lost sight of in the details of the treatment. To him it seemed that opinion and discussion should range round the following points: (1) When to open the membrane; (2) whether syringing or treatment by the dry method was the better practice; (3) whether inflation should be practised after opening the membrane, and if so, how soon; (4) when interference with the naso-pharynx was justifiable after myringotomy. He thought syringing was undesirable, because in any case the fluid did not reach through the membrane to the middle ear. He thought syringing should be avoided, and that even blowing the nose should be done by one side only, the other side being open. No operation on the naso-pharynx was justifiable during the acute stage of the middle-ear suppuration.

Dr. Watson-Williams (Bristol) considered that the general consensus of opinion was essentially early and efficient drainage. After alluding to the value of various local applications, he desired to associate himself with the view that early myringotomy was desirable if the inflammatory trouble was not obviously transient. No harm could result from this simple procedure, and it frequently proved invaluable; but if there was evidence of mastoiditis they were only carrying their principles of early and efficient drainage to a logical conclusion by opening up the mastoid cells and antrum. Without being unduly precipitate, he had no hesitation in advocating the simple mastoid operation (Schwartze) being performed relatively early; otherwise delay might deprive the patient of a chance of recovering with good hearing power, or even subject him to the gravest risk of meningitis and a fatal termination. He of course deprecated anything in the nature of a complete radical operation in the class of case under discussion unless very exceptional and complicating conditions made it imperative, but it was better to perform the simple Schwartze operation too early than subject the patient to unnecessary and grave risks by undue hesitancy.

Professor Holger Mygind, speaking for the second time, said that though very conservative towards radical operation, his indications for simple mastoid operations were very wide. The operation was combined with very little risk compared with the risk of intracranial complications. Surgeons often waited until swelling or tenderness of the mastoid process appeared, but these objective symptoms were absent in a great minority of cases, and especially comparatively frequently absent in cases of intracranial complications, which, therefore, were operated on too late. The simple mastoid operation ought to be done very thoroughly. It was not sufficient alone to open the antrum mastoideum, every cell filled with pus ought to be opened and every softened bony tissue removed; destruction of bone was not infrequently found in the depth under normal tissue. In a long series of cases he had used secondary suture and healing under blood-clot with very satisfactory results.

The President, in summing up, remarked that there was a consensus of opinion in favour of performing early paracentesis. The principles of the wet and dry methods of treatment had been clearly set forth by the various speakers. He himself had found with Professor Alexander that gauze drains were extremely useful so long as they could absorb the discharge, but when the pus became thick they had to fall back on syringing. The meeting was unanimous in regard to the question of the right time for removing tonsils and adenoids in cases of acute otitis, and also in regard to the advisability of opening the antrum in suitable cases. With reference to Professor Mygind's operation of secondary suture after the incomplete mastoid operation, he himself had found that the period of filling up was very prolonged, and so he had adopted a similar procedure with good results. Every one seemed to be agreed against performing the radical operation in acute cases of otitis.

Replies.

Mr. Woods, in reply, said that, in regard to Mr. Adair Dighton's method of treatment with silver nitrate, he must agree with Dr. Milligan that it was quite futile. There was not much to be said in regard to posture; it seemed to him to make very little difference either way. He thought that the discussion on the comparative merits of the wet and dry methods of treatment was somewhat laboured. The important thing was to keep the middle ear monoseptic; how that was to be done was a matter of secondary importance. His own opinion was that washing out was more likely to prevent decomposition. Syringing was done not with the object of washing out the middle-ear cavities, but to remove pus from the meatus, and thus prevent decomposition and infection of the middle ear. As regards the radical operation in the early stages of acute otitis, it was of course monstrous; it should never be done in a monoseptic case.

Dr. Rundle, in reply, associated himself particularly with the observations of Professor Mygind and Dr. Milligan, and expressed his gratification that so many expert otologists were in sympathy with the expectant views of those in charge of fever hospitals.

ON THE VALUE OF DECOMPRESSIVE OPERATIONS IN INTRACRANIAL COMPLICATIONS OF OTITIC ORIGIN:

WITH SPECIAL REFERENCE TO THE TREATMENT OF OTITIC MENINGITIS.

By William Milligan, M.D.,

Aurist and Laryngologist to the Royal Infirmary, Manchester.

One of the most important problems confronting the aural surgeon to-day is the successful treatment of otitic meningitis. Up to the present time the mortality from purulent meningitis (otitic) has been, roughly speaking, 100 per cent.

It is true that sporadic cases of recovery following operation have from time to time been recorded, but the successful cases have been so few and far between as only to accentuate the heavy mortality of the disease.

Surgical technique, although it has been able more or less successfully to cope with sepsis in most parts of the body, has so far achieved but few triumphs in the treatment of purulent meningitis. How is this? In seeking for an explanation we have to consider:

1. The special anatomical relations of the parts affected.
2. The practical difficulty of securing and maintaining efficient drainage; and
3. The particular mode of death from meningitis.

In all cases of purulent meningitis the amount of cerebro-spinal fluid within the skull cap is enormously increased as the result of bacterial infection of the pia arachnoid membranes, with a consequent increase of intracranial pressure. The skull cap being an unyielding structure and incapable of expansion, causes this increased pressure to react upon the more yielding intracranial contents, chief among which are the cerebral vessels, both arteries and veins. Hence a gradually progressive anaemia is induced, with resulting paralysis of such vital nerve centres as the cardiac and respiratory. The fatal issue is due not so much to the presence of sepsis as to the direct mechanical effects of increased intracranial pressure.

Granting that this is so, how are we to counteract this increasing pressure so as to permit the protective efforts of Nature sufficient time to overcome the effects of acute toxaemia and degeneration of nerve tissue. Naturally the first thing is to make an early and an accurate diagnosis of the existence of meningitis. I must frankly admit that of various intracranial complications of purulent otitis media, the one I have found the most difficult to diagnose is meningitis—not, of course, when all the cardinal symptoms are present and in full bloom, when a mistake is hardly possible, and when, unfortunately, the patient is practically beyond relief, but in its early stages, when

there are few leading symptoms, and when the pathological process is fairly localized. Although it is true we classify meningitis for clinical purposes as serous or purulent and acute or chronic, the one stage runs so imperceptibly into the other that it is better, from the surgical point of view at any rate, to regard the pathological process as one, and not as made up of various separate entities.

I do not regard any case as a case of purulent meningitis unless bacteria are found in the cerebro-spinal fluid either microscopically or in culture films. Certainly a diagnosis of purulent meningitis must not be made merely on the evidence of turbid cerebro-spinal fluid, as turbidity is quite common in what is usually termed "serous meningitis," a phase of the pathological process which I regard, however, as the forerunner of the purulent type.

The earliest clinical symptoms of purulent meningitis are:

1. Increase of blood pressure.
2. Papilloedema.
3. Persistent headache.

The presence of these symptoms should at once put the clinician upon his guard, and direct his attention to a systematic and chemical analysis of the cerebro-spinal fluid. Time does not permit of my saying more than that the normal reaction of cerebro-spinal fluid is alkaline, but that as purulency is induced the reaction changes and becomes acid. Moreover, the copper-reducing substance in normal cerebro-spinal fluid, now generally admitted to be of the nature of a dextrose, in the presence of bacterial invasion rapidly disappears. Failure to reduce the copper of Fehling's solution is therefore a most important and accurate indication of the presence of incipient meningitis. From the clinical point of view the presence of an acid reaction, the failure of the cerebro-spinal fluid to reduce Fehling's solution, the presence of albumen and of an excess of globulin, even in the absence of demonstrable organisms, indicates the existence of a definite bacterial invasion of the meninges and calls for immediate operation to thwart the advent of increased intracranial pressure with development of fatal paralytic phenomena.

This brings us now to the consideration of the type of surgical treatment required, for no other treatment is of the slightest value.

The elimination of the primary focus of infection is naturally the first step, either by the performance of a complete post-aural operation, or a complete post-aural operation *plus* a labyrinthectomy should labyrinthine symptoms be present, followed immediately by an extensive decompressive operation either in the temporo-sphenoidal or the cerebellar area—more usually the latter, as most of the cases are due to infection of the meninges in the posterior fossa.

My personal experience of decompressive operations is not great—in all 12 cases. Of these 12 cases, 4 were undertaken when the patient was *in extremis*, and all proved fatal. Of the remaining 8 cases, 5 died and 3 recovered, the percentage of recoveries being thus only a little over 26 per cent. This recovery percentage, low as it certainly is, will doubtless become higher as the means of making an early diagnosis are more appreciated and better known, while I am optimistic enough to believe that the treatment of early cases of purulent meningitis will shortly become a successful surgical procedure.

To secure relief from the rapidly increasing intracranial pressure, which, as has already been pointed out, is the great danger to life, it is necessary to do more than perform repeated lumbar puncture with or without continuous drainage. It is necessary to remove a considerable area of the skull cap and to freely incise the brain membranes. In the temporo-sphenoidal region either a "flap" or an "intermuscular" operation, preferably the former, may be performed.

An area of bone at least 1½ in. square is removed immediately above the external auditory meatus, the dura incised and the pia arachnoid opened.

The pressure within the skull cap at once crowds the brain through the opening thus made, and this undoubtedly interferes with the much desired drainage. By slipping strands of gauze or pieces of rubber tissue between the dura and the brain, a very fair system of drainage may, however, be secured and maintained.

In the cases upon which I have operated, I have removed the dura, corresponding with the bone wound, entirely. A certain amount of herniation has invariably resulted, but in general terms the larger the bone wound the less the hernia. In the cerebellar region the opening may be made between the curved lines of the occipital bone, being made as low as possible to secure freer drainage and to avoid wounding the lateral sinus. The amount of cerebro-spinal fluid which escapes varies with the stage of the pathological process and the virulence of the bacterial invasion. Lately, Haynes of New York has suggested drainage of the "cisterna magna," and carries out the operation as follows: The head of the patient is completely shaved, and the skin prepared in the ordinary way. The patient lies upon the operating table upon his face, with a firm sand pillow under his shoulders, so that his neck is extended. An incision in the middle line and down to the bone is made from the occipital protuberance to the spinous process of the atlas. After the soft tissues have been drawn aside, an opening is made with a ⅜ in. trephine one inch above the "foramen magnum," and a triangle of the intervening bone removed with cutting forceps. The now bulging dura is carefully incised, quite a small opening being made at first. The pia arachnoid is similarly opened. The cerebro-spinal fluid, being under great tension, spurts out. Should the blood pressure fall too rapidly, the flow is temporarily checked. The incision is then carefully enlarged, and a rubber drainage tube inserted into the "cisterna magna," between the lateral lobes of the cerebellum. Haynes claims that, by adopting this procedure, the best drainage is secured, and that no cerebellar hernia results.

In acute oedematous conditions of the brain following the presence of cerebral or cerebellar abscess marked relief will be afforded if in addition to opening and draining the abscess the brain be extensively decompressed. The tendency in the past has been to make rather too small openings through the skull cap. Practical experience, however, has demonstrated that in order to ward off the fatal effects of increased intracranial pressure large openings should be made and continuous drainage maintained.

The following are the details of three successful cases operated on by the author.

CASE I.

E. B., female, aged 11, was admitted to hospital with a history of long-continued discharge from the left ear, and of recent headache and vomiting. She had had a severe attack of measles at the age of 5, and since that time had been delicate. On admission her temperature was 102° F.; pulse 140; respirations 30. She was very drowsy, and could only be roused by shouting. No facial paralysis. Nystagmus upon looking to left side; pupils equal and dilated, reacted sluggishly. Well-marked bilateral optic neuritis. Tongue dry and coated. *Tache cérébrale* well marked. Knee-jerks equal, but very sluggish. Plantar reflex Babinski in type. Well marked Kernig's sign. Rigidity of neck muscles. Cerebro-spinal fluid turbid; bacteria (streptococci) present.

Operation.—Left mastoid antrum opened. Contained a very foul cholesteatoma. Lateral sinus bulged into wound on opening, contained no thrombus. Middle fossa exposed, and dura found to bulge at once into trephine opening. No abscess in temporo-sphenoidal lobe. A disc of bone was then removed between the curved lines of the occipital bone. Dura found to present a yellow coloration. On being incised pus welled out, nearly half an ounce being collected. Found to swarm with streptococci. Dura corresponding to trephine opening entirely removed, and strips of gauze passed under it into the pia arachnoid space. Continuous drainage was in this way maintained. A considerable hernia of the temporo-sphenoidal lobe and of the cerebellum developed. After all acute symptoms had subsided hernia reduced by pressure with a lead plate and an elastic bandage.

CASE II.

E. L., female, aged 16, had suffered from right-sided purulent otitis media for ten years. The patient was admitted to hospital complaining of severe occipital headache, frequent attacks of sickness, and constant vertigo. Pulse-rate 54, temperature 95.4° F., respirations 14. Well-marked cerebellar nystagmus and slight papilloedema were present.

A radical mastoid operation was performed, followed by exposure of the cerebellum through the posterior mastoid wall. One and a half ounces of pus were evacuated. For two days there was marked relief, after which headache returned accompanied by marked retraction of the head and stiffness of the neck muscles. A decompression operation was then performed, a large opening being made between the curved lines of the occipital bone and as low down as possible. On removal of bone the dura, which appeared to be of a yellowish colour, bulged through the trephine opening. It was very carefully incised. Pus at once flowed out, almost half an ounce being collected. Bacteriologically it was found to swarm with streptococci. The area of dura mater corresponding to the trephine opening was removed and strips of gauze inserted

between the dura and the cerebellum. The patient suffered severely from shock, but gradually recovered. A fairly large cerebellar hernia formed, which after the subsidence of all urgent symptoms was successfully reduced by pressure with a lead plate and an elastic bandage. A good although somewhat slow recovery was made, and seven weeks after the decompressive operation the patient resumed her occupation, that of a messenger, and has remained steadily at work ever since. Her mental condition appears to be quite normal.

CASE III.

W. H., male, aged 10, admitted with history of a fall followed by dizziness, headache, nausea, and slow cerebration. When two years old he had an attack of measles; the right ear had suppurated since. On admission to hospital no evidence of injury to skull cap was found, but he had a sprained wrist. Temperature 98° F., pulse 90. The patient was in a very dazed condition, very deaf, and mentally very slow. No paralysis was found present. Nystagmus was well marked, and was both vertical and horizontal. Optic neuritis well marked upon both sides, more especially, however, upon the right side. Knee-jerks sluggish; no Babinski, no Kernig.

Radical mastoid operation performed; very little pus found in antrum. Middle fossa exposed and temporo-sphenoidal lobe explored; no pus found, large quantity of cerebro-spinal fluid escaped. For a few days marked improvement, followed, however, by relapse and very slow cerebration.

Decompressive operation performed over cerebellum. Dura opened and a large quantity of cerebro-spinal fluid drained away. Fluid turbid and contained bacteria (streptococci and staphylococci). Dura entirely removed and gauze drains inserted. Hernia of cerebellum treated by pressure with lead plate. Recovery.

DISCUSSION.

Professor HOLGER MYGIND (Copenhagen) had been deeply interested in Dr. Milligan's paper, the treatment of otitic meningitis having occurred comparatively frequently in his hospital practice, and he had up to the present operated on a comparatively large number of patients, of which about one-fourth had recovered. He agreed entirely with Dr. Milligan that the diagnosis was very difficult; in fact, there was only one means of ascertaining it—lumbar puncture with the production of a turbid fluid containing polynuclear cells in excess. In the cases he had seen recover through operation, bacteria were not always present, and if they did not consider these cases as being purulent meningitis, the mortality of otitic meningitis was much heavier. He had, however, seen fatal cases of otitic meningitis where bacteria were absent at first, although the cerebro-spinal fluid was very turbid. Dr. Milligan's statement of progressive arterial tension and of the failure of the cerebro-spinal fluid to reduce copper and the acid reaction were very interesting, and he would certainly try this means of diagnosis in future. As to the operative treatment, the free opening of the dura and the free drainage of the arachnoid space rested on sound surgical principles, and he had used this method of treatment in his first series of cases. He had, however, had such hard struggles against prolapse of the brain, and had read such sad experiences that he had been more conservative lately, and he did not generally open the dura, except when there were signs of pachymeningitis externa or interna or suspicion of abscess of the brain. He merely exposed the dura for inspection by means of a large craniotomy opening of the same size and form as Dr. Milligan suggested. He had become more and more convinced that the radical removal of this primary focus was the principal thing to do; this included frequently the opening of the labyrinth, and he therefore always performed the radical operation in order to be able to inspect the labyrinthine wall thoroughly. They were, however, still in the experimental stage of the question of the operative treatment of otitic meningitis, and he considered Dr. Milligan's paper a valuable contribution to the final solution of the question.

Mr. E. MALCOLM STOCKDALE (Liverpool) said that his experience of the treatment of otitic meningitis by repeated lumbar punctures was limited to a small number of cases, but none of these had recovered. He related the case of a boy he had operated upon some years before for septic thrombosis of the lateral sinus involving the jugular vein, and in which there was extensive necrosis of the occipital bone. At the time of operation he performed lumbar puncture, drawing off clear fluid; during the following week this was done on two subsequent occasions. Each specimen was examined by the pathologist to the Liverpool Eye and Ear Infirmary, and reported to contain micrococci, a culture yielding staphylococci. The third specimen was examined immediately after withdrawal, optic neuritis being present, more marked on the side of the lesion, there being also twitchings of the arms and legs. Temperature 103.4°. It was decided to drain the subarachnoid space at once. This was done by incising the dura mater in the middle and posterior fossae. The cerebellum at once began to bulge into the wound, and a hernia formed. Later this burst spontaneously, and was excised. The boy made an excellent recovery.

Dr. MILLIGAN, in reply, could not agree with Professor Mygind in the diagnosis of suppurative meningitis. Some of the cases he would have called serous, and not purulent, meningitis. If bacteria themselves were not found in the cerebro-spinal fluid, then at least evidence of their presence ought to be discovered. A discussion on this subject was very useful; for instance, he did not agree with not opening the dura. He personally had seen no bad results from herniation of brain substance. He thought that if early operation could be attempted they ought to expect marked success in treating cases of suppurative meningitis.

DISCUSSION ON THE PREVENTION OF DEAFNESS IN NON-SUPPURATIVE CASES.

OPENING PAPER.

By J. KERR LOVE, M.D.,
Aural Surgeon, Glasgow Royal Infirmary.

I REFER to the fact that deafness is but a symptom merely to define the scope of this paper, which, if it be true to its title, must deal with the prevention of all forms of deafness which are not associated with suppuration. At once the mind even of the trained otologist flies to chronic aural catarrh and oto-sclerosis, but the subject is much bigger than these names indicate. I reckon that, in addition to these diseases, I must include deafness from post-nasal adenoids, from meningitis, from syphilitic disease, and true hereditary deafness.

Chronic Aural Catarrh and Oto-sclerosis.

The confusion which still exists in the diagnosis of chronic aural catarrh and oto-sclerosis makes any indication for preventive measures extremely difficult. Some surgeons scarcely ever see oto-sclerosis, some meet it very often, most consider it hereditary; many think chronic aural catarrh hereditary also; some think oto-sclerosis syphilitic, others believe in no such connexion. I have never seen a positive Wassermann reaction in a case. Some observers think the disease commences in the nose and throat like chronic aural catarrh, and that the middle and internal ears are only secondarily affected. Most of us have considered the absence of any nasal or naso-pharyngeal affection to be one of the features which distinguish oto-sclerosis from chronic nasal catarrh. Now I have not mentioned all the differences of opinion which exist about these two diseases, and I do not wish to provoke discussion on the differences. I have indicated these differences of opinion to call attention to the fact that the diseases need further study with a view to their prevention. We cannot cure them. They are the reproach of our speciality. Fibrolysin, high frequency currents, pneumo-massage, potassium iodide, intra-tympanic operations, and a dozen other remedies have walked across the stage, and most of them have disappeared. We are still looking for the means of cure for these two conditions. Reputations built on the invention of a new instrument or the booming of a new drug wax and wane, and we seem about as far as ever from a real solution of how to cure chronic non-suppurative deafness in the adult.

It is not because investigators are not in earnest in the quest that the solution has not been found. I believe the solution to be very difficult. But alongside the pathological and clinical work being done in this field we want, I think, very careful observation of the family histories of cases of chronic deafness in the adult. Every case of chronic deafness should be followed whenever possible through at least three generations, so that the place of heredity in the production of these cases may be determined. The adventitious factors in the etiology of these

two diseases may be numerous. When they are catalogued in textbooks on diseases of the ear these factors are so differently mixed that the impression one gets is that authors in their difficulty include a little of every local and general condition. And then, to make sure that nothing has escaped, hereditary predisposition is added. Is there any remedy for this but accurate records of individual cases and of family histories?

Adenoids.

The case is different with adenoid deafness in the young child. I do not mean to say that there is no hereditary element here, but we have a tangible cause, the removal of which early in life is usually followed by the complete restoration of hearing. The success of this operation in restoring hearing has been so great, and is so uniform that the study of the cause of the growths has not been seriously attempted. Most of what we have in the way of study is really speculation or guess work. But even here prevention would be better than cure. It is not often in the practice of medicine that we get success so uniform in the treatment of a condition the cause of which is so obscure as we do in the treatment of post-nasal adenoids. Great as this success is, I feel sure that the future of our patients would be even better did we know how to prevent the occurrence of these growths altogether.

In this connexion, points for discussion which seem to me important are:

1. The influence of heredity in the production of post-nasal adenoids.
2. The influence of the various methods of feeding children in the production of these growths.
3. The influence of catarrhal processes in their production.

The belief held by some otologists that much of the deafness of adult life has its foundation in the nasal, and especially the post-nasal, obstruction of childhood makes it incumbent on an Association like ours to keep before those interested in the young the duty of testing the hearing of every young child. The best agency through which this can be done at present is the school authority. If it be true that most adult deafness of the non-suppurative type begins in the nasal obstruction of childhood, then every school child should have his hearing tested, and every case of slightly defective hearing should be medically or surgically treated, even if the deafness be not great enough to interfere with educational progress.

Meningitis.

Ten thousand children die annually in England alone from the various forms of meningitis, and a large number of those who do not die are made quite deaf, and yet this disease, or rather the various diseases which go under the name of meningitis, are not notifiable except when meningitis is epidemic and is called by the special name of cerebro-spinal fever. Now practically all forms of meningitis are due to infection, and when the disease causes deafness at all it causes it in such a high degree and at such an early age that dumbness results. There are over 5,000 children at present being educated in special schools for the deaf in Great Britain, and it is probable that at least a fifth of these are deaf from meningitis. As these 5,000 children represent about a fifth of the deaf-mutes in the community, it is probable that there are 5,000 deaf-mutes in Britain to-day whose deafness is due to meningitis. I should therefore press for the notification and treatment in hospital of all cases of meningitis occurring in childhood, whether tuberculous, epidemic, or sporadic. These cases cannot be studied in the home, and for the most part they occur in houses of such a poor type that they should not be treated there.

Syphilis.

I could easily spend the whole of the time allotted to this paper on syphilitic deafness. This is usually non-suppurative. For the past six months I have been engaged taking the bloods of 100 deaf children, and Dr. Carl Browning has been carrying out the examination of most of these bloods by the Wassermann test or reaction. The inquiry is not yet finished, but the following indication may be given of the direction in which conclusions will ultimately be drawn

1. Syphilis in the parent may cause congenital deafness in the children, and probably does so to a greater extent than the Wassermann reaction discovers. Congenital syphilitic deafness is often all that remains of dead or dying syphilitic taint, the presence of which is not discoverable by any chemical or biological test at present in our possession.
2. Syphilis in the parent is a common cause of the death of the child at or before birth and, later in the family history, of the appearance of deafness in the children who have survived. This deafness, which tends to come on about the second decade of life, is usually associated with keratitis, and this combination has nearly always a positive Wassermann reaction. There are, however, exceptions to this rule.

For the prevention of congenital syphilis we must have, I think, something like the notification of pregnancy. This needs no special legislation. Under the Insurance Act maternity benefit will be claimed for all pregnancies which approach anything like the full term, and the occurrence of a stillborn child will be certified, along with the probable cause of the death of the child. It should be possible to anticipate the disasters of deafness and blindness which occur in the later members of a syphilitic family by putting the parents under treatment and so preventing the deafness. In dealing with congenital syphilis and in attempting to prevent the deafness due to it we must throw aside the curtain that has screened it so long, and discuss it not only amongst ourselves but with educated laymen as an ordinary infectious disease, the specific cause of which is known and the prevention of which is possible only by dealing with it at its source—the blood of the father and mother.

True Hereditary Deafness in Children.

The last type of deafness I mean to deal with is true hereditary deafness occurring in children. If the definition of hereditary deafness be made strictly scientific this class is found not to be very large—probably less than 10 per cent. of the deaf and dumb. The proof of heredity must rest on deaf-mutism having been hereditary, and on its having occurred either in the direct line or in some collateral branch of the family. The occurrence of deaf brothers and sisters is not by itself of much importance, and the occurrence of hardness of hearing is of even less importance. At present we are like strangers who have only for guidance placards on which is printed: "This way to the Show." When we get there we have a catalogue handed us when we want a stud book. If we are to have anything done towards preventing hereditary deafness, we must have an agency like the Eugenics Record Office of the United States, where we may study the history of deaf families through several generations. My own feeling is that true hereditary deafness thus studied will be found to follow Mendelian lines. Whatever theory of heredity would be found to fit hereditary deafness, three methods may be adopted for controlling it.

1. *The Prevention of the Marriage of the Hereditarily Deaf.*—This is rendered impracticable by the fact that it would be useless unless the prohibition were extended to the hearing members of the deaf families, who transmit the defect with the same certainty as the deaf members.
2. *The Sterilization of the Hereditarily Deaf.*—Apart from the fact that public feeling would be against this step, the same objection must be urged against it as has been advanced against the prevention of marriage. It would be useless unless the hearing members of the fraternity were included.
3. *The Education of the Hereditarily Deaf and of their Relatives on the Dangers of Marriage and of Intermarriage.*—Now that the deaf and dumb are kept at school till the age of 16, and are in many cases under some kind of after-care agency for several years later, much good may be done by education on the dangers I have hinted at.

Some three years ago a discussion took place at the Royal Society of Medicine on heredity and disease. The discussion lasted for four weeks—one night each week—and although many of the leading members of our profession took part in it, the heredity of deafness was never mentioned. The discussion included tuberculosis, insanity, cancer, and a dozen other diseases, not one of which offered a field of observation equal to that of deafness. It included eye colour, coat colour, albinism, and many other characteristics which were not strictly diseased characters, and none of which has the human significance which deafness has. Now, I do not mean to settle here whether or not true hereditary deafness is a diseased condition at all, but there is no doubt that congenital deafness is often hereditary, and I suspect that heredity plays an important part in the production of deafness which is not congenital, and yet it would seem that we as individuals or as a profession hardly interest ourselves in this important subject.

DISCUSSION.

Professor HOLGER MYGIND (Copenhagen) said that so far as the treatment of oto-sclerosis was concerned, his experience was that it was very often complicated with chronic catarrh of the middle ear and with catarrh of the upper respiratory tract, and that there were a good many cases where local treatment, and especially treatment with inflation of air through the Eustachian catheter, was of use, and many patients returned year after year to be treated. As to the question of epidemic cerebro-spinal meningitis, he could recall the fact that he had found in Denmark that cases of acquired deaf-mutism were collected in a limited district during a short period, and that the causes often were reported as brain fever, typhoid fever, pneumonia, etc. This fact was most easily explained by the existence of small epidemics of cerebro-spinal meningitis. In a few cases it was possible to prevent total deafness by using pilocarpin subcutaneously at an early stage. While hereditary syphilis was a not infrequent cause of deafness at puberty it was very rarely the cause of congenital deafness. As to the prevention of marriages between people with congenital or hereditary deafness, etc., he thought that medical men ought not to act the part of Providence. Altogether, little could be done to prevent non-suppurative diseases of the ear, except when caused by adenoids, which, he agreed with Dr. Kerr Love, were hereditary, or by catarrhal diseases. As to suppurative diseases of the ear, the matter was quite different. Here the field of prevention was large, and what he thought would be an important step in this direction was the appointment of competent otologists at all fever hospitals to treat suppuration of the middle ear caused especially by scarlet fever and measles, which often not only produced deafness but also chronic suppuration, which comparatively frequently ended with fatal intracranial complications.

Mr. G. J. JENKINS (London) remarked that heredity played so many tricks that he could not help regarding it as a dubious factor. Whole families might have oto-sclerosis, and yet not a single ancestor could be traced with a similar condition. Generations might be passed over. He thought that the remarks of Dr. Mygind as to the prevention of marriage should be borne in mind.

Mr. E. MALCOLM STOCKDALE (Liverpool) said that cases of deafness due to congenital syphilis coming under his care had been so advanced that treatment was hopeless. He would like to hear from Dr. Love whether treatment could prevent these cases from advancing. In his experience oto-sclerosis was not due to syphilis, but was always associated with the condition usually known as chronic middle-ear catarrh. After or with the removal of adenoids it was important to treat nasal obstruction, which was frequently present.

Mr. W. M. MOLLISON (London) did not think that adenoids were hereditary. Their effects were due largely to the catarrh of the naso-pharynx or nose consequent on mouth breathing. This mouth breathing was to a great extent imitative. It was striking to notice that the parents and friends of most children who suffered from mouth-breathing and its attendant evils brought to the out-patient departments of London hospitals were themselves mouth-breathers. All children suffered from adenoids; it was a matter of training to make children breathe through the nose.

Dr. MYGIND (Copenhagen), speaking a second time, disagreed with the previous speaker, and thought that the fact that children with adenoids often had parents who were mouth-breathers was strong evidence in support of the theory that adenoids were hereditary.

The PRESIDENT thought that adenoids were probably hereditary, but it must not be forgotten that nearly every child had adenoids. He had been much interested at one time in observing the signs of degeneracy among persons attending his out-patient department. He found that about 75 per cent. of the total showed stigmata to a greater or less degree. Though he might seem to be wandering somewhat beyond the scope of the discussion, as regards the ear, he thought that degeneracy had a distinct bearing on the subject under review. In cases he had observed, the stigmata in the main apppeared to take the form of a mixture of oto-sclerosis, catarrh, and nerve deafness. It was a very elusive condition, and could not be placed definitely under either of these three heads. Deafness was very prevalent among criminals, prostitutes, and such like. How could the principles of Mendelism be applied to deafness? One particular factor could not be picked out. As regards the treatment of chronic middle-ear catarrh, he thought that 80 per cent. of patients must be improved in his out-patient clinic. Though he often was unable to detect any improvement at all in their hearing, even the reverse, he could not explain otherwise why they should continue to attend for months at a time, unless at any rate they thought that they were getting better.

Dr. MYGIND (Copenhagen), speaking for the third time, remarked that as regards the appointment of skilled otologists to fever hospitals, a recommendation to that effect had been made in Denmark some years before, and it was also their custom to distribute printed papers, giving directions to patients as to the treatment of discharges from the ear.

Dr. KERR LOVE, in replying, agreed with Professor Mygind that it was very necessary to have an expert otologist on the staff of every fever hospital. Continuing, he said that it was necessary to discriminate very clearly between the true hereditary deafness and the deafness of degeneracy. The true hereditary deaf bore no other stigmata. He had come to the conclusion that oto-sclerosis and middle-ear catarrh were in all probability associated conditions, and that the one was rarely seen without the other. In answer to Mr. Stockdale, he said that he had so far done very little with salvarsan in improving deafness.

RESOLUTION.

At the close of the discussion on Dr. Kerr Love's paper it was resolved by the Section to forward the following resolution to the Council of the Association:

> That the Section of Otology, having regard to the opinions expressed in the discussion on the subject of acute suppurative otitis media that the acute exanthemata are prolific causes of acquired deafness and frequently lead to fatal complications, recommend the appointment of an otologist to all fever hospitals. Further, as the outcome of the discussion on the prevention of deafness, the Section recommends that the Council uses its influence for the establishment of a Eugenics Record Office in this country, where the study of the hereditariness of deafness can be carried out.

THE INDICATIONS FOR THE SCHWARTZE OPERATION.

By G. J. JENKINS, F.R.C.S.,
Assistant Aural Surgeon, King's College Hospital.

THIS subject, suggested by our most esteemed President, and which I have the honour to bring forward for your consideration, is one of great importance and interest. It is beset with difficulties of various kinds, and I would be satisfied if my communication should help on scientific research that ultimately might enable us to deal more satisfactorily with a certain group of cases.

The Schwartze operation was originally performed to allow of free drainage of the posterior parts of the middle-ear tract in acute mastoiditis. The operation is so designed that these parts may be reached without injury of the tympanic membrane or ossicles, and without involving the external auditory meatus.

No doubt, the good effect of the procedure in this acute mastoiditis is largely due to the free drainage, but at the same time the permanent good result must in some cases be due to the incidental removal of severely damaged tissue. Sufficient importance has not been attached to this incidental effect of the operation until more or less recent years, and possibly for this reason the operation has not been used as often as it might have been in some subacute or even chronic septic affections of the middle-ear tract. I am sure that all of us have met conditions that might be described as subacute or chronic which could be treated most satisfactorily by this operation. It is the object of this paper to help to gather together the indications for this operation in those conditions which have, until more or less recently, been treated expectantly until

a complete post-aural operation has become necessary, or have been treated by the complete post-aural operation when a Schwartze operation would have been sufficient to remove the disease and at the same time preserve better hearing than follows complete post-aural operation at its best.

Having recognized that in performing this operation we have in view not only the free drainage of the infected regions, but also the removal of permanently damaged tissue, the usefulness of the operation seems to be extended. The parts that may be exposed by this method are, briefly, the mastoid and the walls of the antrum and posterior part of the attic. Obviously, then, this surgical method cannot reach any lesion affecting the lower part of the tympanic cavity or its contents, except in so far as by opening the antrum we provide somewhat better means of treating this region.

The operation can only be indicated, then, in those cases in which the auditory apparatus has not been seriously damaged.

To understand the possibilities of and the clinical indications for this operation it is necessary to have some idea of the parts, more particularly the osseous, which become seriously affected by septic infections of the middle-ear tract.

In most cases of infection of the middle-ear region the pathological process is confined to the lining membrane of the cavities. In, however, very acute infections, such as occur in association with the infective fevers, there is often a bone necrosis produced. The outer antral wall and the descending process of the incus are most commonly so affected. The outer attic wall, and other parts affected by bony lesion, I believe, are more usually affected secondarily, and not usually in the primary stage of the infection of the tract.

In many cases of acute infection of the middle-ear tract the attic and antrum escape entirely. We are not at present concerned with such conditions.

If, however, the infection reaches the attic and antrum then there may be more serious consequences.

First, let us consider what may happen when the pathological process is more or less confined to the lining membrane in this general infection of the middle-ear tract. If there should be a cellular mastoid then the symptoms and signs of acute mastoiditis would be expected.

Occasionally when the subject is very resistant to the infection this condition runs a subacute course. The signs and symptoms of middle-ear inflammation may almost disappear, but slight and indefinite pain over the mastoid and the occipital region, some very slight tenderness of the mastoid and slight rise of temperature in the evening indicate that these parts have not recovered from the infection. There may be no oedema over the mastoid. In the few cases of this condition that have come under my observation it has seemed advisable to open the antrum as well as the air cells.

It is also probable, from evidence at operation, that there may be infection of the antrum of a cellular mastoid without general symptoms of the mastoid cells.

Should such a lining membrane affection occur with the diploëtic or infantile type of mastoid there is every possibility, and I think probability, of resolution without operation, should there be free drainage into the middle ear and the external auditory meatus.

If, however, the drainage is interfered with by adhesions, etc., there is a localized septic condition in contact with the outer attic and antrum walls. This shows itself as a redness and swelling of the superior and postero-superior part of the wall of the external auditory meatus close to the tympanic membrane. This condition will not be confused with the bulging postero-superior wall of the meatus seen in the early stage of very severe infections.

The condition now referred to becomes more definite as the more acute signs disappear. The acute stage is usually a comparatively mild one, and very often there is no perforation of the membrane. The patient may or may not have a slight evening rise in temperature and complain of uneasiness in the ear and of some deafness. Some of these cases recover spontaneously, but others, if left alone, progress until a perforation occurs and a fistula is established between the attic or the antrum and the external auditory meatus.

Recently I have performed the Schwartze operation on two such cases before perforation had occurred, carefully chiselling away the posterior part of the outer attic wall, and in one I found a bead of pus in relation to the outer attic wall, but in the other only signs of local inflammation. Both cases recovered completely and the hearing was satisfactory.

Secondly, let us consider those acute septic infections with which there are lesions of the bony outer wall of the antrum and possibly attic.

A primary lesion of the bone probably requires a very severe infection for its cause, such as occurs with the specific fevers, more particularly scarlet fever and measles. It is more particularly in this class of cases that the anatomy of the mastoid has important bearing on the progress of the case. You are familiar with the work of Mr. Arthur Cheatle on this subject, and I shall make use of the descriptions which he has given to the various anatomical types.

Projecting towards the antral cavity from the outer wall there is a group of fine processes of bone enclosing long narrow spaces called the fetal antral cells. This anatomical condition sometimes extends to the posterior part of the outer attic wall. It is not difficult to understand that when a severe inflammation of the lining membrane occurs in this region the swelling leads to strangulation of the nutrient vessels, ultimately causing necrosis of this region in part or in whole. Most of us have some time removed the mass of bone forming the outer antrum wall as a sequestrum.

In an acute virulent infection of the antrum there is the liability to this necrosis. If the necrosed mass should be large (dependent on the extent of the distribution of the vessels from the antral wall), or if the mastoid should happen to be cellular, then there are the coarse external signs of acute mastoiditis, and the usual incomplete post-aural operation is done.

If, however, there should be a dense outer antral wall, dense external to the fetal cells, as in the infantile or diploëtic type, then the external signs are very slight or even absent. In such cases there is usually to be seen a bulging of the postero-superior part of the mastoid wall, with or without perforation of the tympanic membrane. With general signs and symptoms such a condition is sufficient to justify the Schwartze operation.

If there should happen to be sufficient drainage of the attic and antrum by an early perforation of the tympanic membrane this localized meatal swelling may not occur.

Should the patient escape internal ear and intracranial complications, it is possible, by the discharges escaping into the external auditory meatus either by the perforation of the tympanic membrane or of the outer attic wall, for the condition known as chronic otorrhoea to be established, and it is obvious that such a condition is not in the least likely to recover spontaneously. The necrosis in the outer antral wall may or may not be extensive, but in whatever degree it will be a persistent cause of purulent discharge. I do not propose to describe the clinical course of such cases, but to consider the possibilities of recognizing clinically the presence of this pathological condition.

What are the indications of a chronic otorrhoea dependent upon severe septic injury of the walls of the antrum or attic? The following seem to me the most important:

(*a*) The history of a severe septic infection of the middle-ear tract, such as may be associated with scarlet fever or measles.

(*b*) The position of the perforation of the tympanic membrane is usually posterior, superior, or through the outer attic wall.

(*c*) If the perforation is large enough, by means of Peters's magnifying modification of Siegle's exhausting speculum it is possible sometimes to see the pus coming down as it is extracted from the attic or the antrum.

(*d*) The persistence of a perforation when all discharge has apparently ceased, and the recurrence of discharge after a period of quiescence.

(*e*) Lastly, a diploëtic or infantile mastoid.

If the mastoid be cellular and an acute infection occurs there would be an acute mastoiditis, but if the mastoid be diploëtic or infantile and the patient escape a cranial or internal ear affection there is the possibility of chronic otorrhoea being established. Further evidence of the

importance of this infantile or diploëtic mastoid in relation to chronic otorrhoea is its almost constant presence in those cases which we regard as requiring the complete post-aural operation.

We have the following methods of investigating the anatomical type of the mastoid:

1. By *x*-ray photography.
2. By condition of the mastoid on the other side if there has been an operation on that side.
3. Transillumination.

It will be seen that there are difficulties in the way of all these means of investigation, but technique has advanced considerably with *x*-ray work, and we are now obtaining more or less reliable information. I have tried a transillumination instrument, but, so far, the results have been unsatisfactory, possibly from defective instrument. Even without this information regarding the anatomy of the mastoid, I would be inclined to say that if there is a history of severe infection, and there are the signs mentioned above, and the usual expectant treatment has been carried out thoroughly for some time—say, three to six months—I would perform the Schwartze operation.

I have given a time limit for expectant treatment, but herein lies the difficulty in treating such cases. Three months seems a sufficient time for the lining membrane disease of the milder type of infection to clear up, and I do not think there is any urgency for operative interference in the cases in which there has been more severe damage at the onset. I believe that most of the damage (especially bone injury), if not all, is done in the earliest stage of the infection, and that though there is no object in waiting if we could be sure of the presence of the severe injury, there is at the same time no further harm done if the ear condition is treated expectantly for a short period. It would not be wise to allow a purulent discharge to bathe indefinitely the hitherto more or less uninjured ossicles, as there would always be the danger of a further active inflammation which might do further damage.

It may seem that in the above a line has been drawn too sharply between the milder and severer forms of infection, but the definite clinical course of the severe infection associated with the specific fever, I think, justifies the classification. It is obvious that the two forms must approach one another, both as to the degree of virulence of infection and as to the clinical course.

Fistula of the attic or antrum opening into the external auditory meatus, when the hearing is good, is a condition which gives otologists some difficulty.

No doubt many of these cases might have been prevented by a Schwartze operation in the early stage when the local signs of inflammation of the outer walls of these cavities were in evidence.

Such a fistula implies a cavity shut off more or less completely from the rest of the middle-ear tract. This space may be reached by the incomplete post-aural operation by carefully removing the outer attic wall.

My experience has been that the operation is not always satisfactory, and that the results have been better in the early than in the longer established cases, and better in actively discharging than in the dry cases.

The subject is a broad one, with many difficulties, and I am fully conscious of the imperfections of my treatment of it in this short paper, but hope this may serve to plead for a more scientific foundation for our treatment of "chronic otorrhoea" and certain subacute inflammatory processes of the middle-ear tract.

DISCUSSION.

Dr. Kerr Love (Glasgow) said that the longer he worked at mastoids the more did he fall back for guidance in individual cases on an indefinable instinct rather than a set table of indications. If there was any doubt about the condition of an antrum it should invariably be opened, and then the condition found would determine what further treatment was necessary.

Mr. E. Malcolm Stockdale (Liverpool) thought that in certain cases it was difficult to decide when the antrum should be opened. He was of opinion that if the discharge was so profuse that it could not possibly be secreted by the tympanum a mastoid operation was indicated. In chronic cases the naso-pharynx should first receive attention. If the discharge did not soon cease, then a mastoid operation was advisable, but the tympanum should be preserved unless damaged beyond recovery.

Mr. W. M. Mollison (London) agreed with Mr. Jenkins that cases of acute mastoiditis with a drum of normal appearance were extremely rare. He had seen two cases, both in children of a few months of age. He had found transillumination of little practical value. He did not feel that the amount of the discharge was any indication at all for or against operation.

The President thought that too much operating had been done without proper classification of the cases suitable for one or other operative procedure. His experience also was that cases of acute mastoiditis without any perforation of the membrane were very few. He had always found it difficult to determine the condition of the incus before operation, so that there was an element of doubt in many cases whether the Schwartze or the radical operation should be done. He would like to know how much interference with the movements of the ossicles there would be after removal of the outer wall of the attic. In investigating a case the exhausting speculum was invaluable. He thought that a great deal more work would have to be done before *x*-ray readings of the mastoid were properly understood. Little information could be gathered from transillumination or from other measures which had from time to time been tried. Antrotomy was far and away the most reliable method.

Mr. Jenkins, in replying, again emphasized the value of the Schwartze operation in removing diseased tissue as well as providing free drainage. He thought that the amount of the discharge was no indication at all of the area of the parts affected. He had been practising lately a further method of investigation—namely, by the probe—but as yet he had not learnt very much from it and its passage was both difficult and painful.

SECTION OF NAVY, ARMY, AND AMBULANCE.

Colonel Damer Harrisson, K.H.S., A.M.S. (T.F.),
President.

PRESIDENT'S INTRODUCTORY REMARKS.

The President limited his opening remarks to according a brief welcome to members of the Section, especially to a number of combatant officers of the regular forces who were attending the meeting of the Section by invitation. It was the first time, he believed, on which the proceedings of the Section had been thus attended.

FACTORS AFFECTING THE MARCHING POWERS OF TROOPS.

By Captain N. Dunbar Walker,
Royal Army Medical Corps.

It has been said that the two most important military operations in which a soldier has to take part are marching and "sitting still." It is the former of the two with which I am to deal. De Ternay opens his treatise on tactics in the following manner:

> If one classifies military acquirements regarding their relative degree of importance, marching is unquestionably the most essential part of the great art of war.[1]

Marching has been described as—

> The very purport of the existence of the foot soldier, the Alpha and Omega of his being.[2]

These are quotations which express an essential truth, and could be paralleled by similar remarks from the pages of military writers of all ages. At the present day the increased mobility of armies, due to improvements in mechanical transport, has only resulted in greater demands on the marching powers of the soldier. At the same time it must be remembered that in peace time the

average man has to rely more and more on mechanical means of movement—bicycles, etc.—and he is becoming, therefore, less and less accustomed to the natural methods of progression. Before going further it will be advantageous to define what is meant by marching, and I cannot do better than quote Colonel Melville, who says that marching is

> walking; wearing certain clothes in a certain manner, carrying a certain load distributed on the body in a certain manner, as a unit in a body of men; at a pace regulated by the average physical conformation of the mass, not by the individual peculiarities of any one of its component units.[3]

In examining the factors affecting the marching power of troops, I will begin first with the individual, and throughout this paper I shall of course take the private soldier in the ranks of an infantry battalion as the typical unit.

As regards age: For the ordinary work of marching the older the man is, within limits, the better. Napoleon acknowledged the truth of this statement when he said, "I must have grown men; boys only serve to fill the hospitals and encumber the roadsides." The reservists in South Africa rendered a good account of themselves, and showed that within the ordinary limits of military age, say up to 35, their marching powers were not impaired. On the other hand, insufficient age has a very serious effect, and this is a disadvantage of a voluntary system of service like ours. The lad of 18 is not fully developed, and requires very careful training if he is not to run the risk of a breakdown under the strain of marching.

As regards physique: The man of average height is the best marcher, and as long as weight is not disproportionate to height it may be disregarded.

Men who have developed, since enlistment, certain abnormalities of the body or its organs—such as pronounced flat-foot or a fatty heart—must be weeded out before a campaign. The former defect, if bad, absolutely incapacitates a man almost at once, while the latter renders the soldier liable to heat-stroke.

Occupation prior to enlistment is not of great importance in our army, though in general it may be anticipated that the countryman would be a better marcher than the townsman. With reservists this factor would probably prove of considerable importance, especially in the earlier weeks of a campaign, and it is desirable to make the early marches of the strategic concentration as short as possible for the sake of a large number of men whose occupations and lack of training have unfitted them for strenuous physical exertion.

As regards training: We must remember that although marching is essentially a physical exercise, the efficiency of the soldier in this respect is greatly influenced by moral considerations, and the moral side of marching must not be forgotten in carrying out the training of the soldier. First, marching should be almost a habit. Von der Goltz has pointed out that

> An exertion which by previous experience a soldier[4] has learnt to regard as anything but extraordinary, he endures far more easily than one quite strange to him. If the fatiguing march exercises and the long marches in peace time were discontinued, the army would lose by degrees the standard for measuring what human nature can endure without prejudice, if only a little good-will be present.

Even on service during the military operation of "sitting still" practice in marching must not be omitted. In several of the Duke of Wellington's orders in the Peninsular war it is evident he considers this of great importance. The following were two such orders:

> G.A.O. Badajoz, 31st of October, 1809.
> 3. The Commander of the Forces requests the officers commanding divisions will make a distance of not less than three leagues in marching order twice a week.[5]

> G.O. Madrid, 22nd of August, 1812.
> The Commander of the Forces requests that the several Divisions of Infantry be marched the distance of between six and eight miles every third morning at dawn of the day, and that the regiments may be exercised in some of the manœuvres ordered for the troops, every day on which they are not marched as above ordered.[6]

The Japanese in Manchuria were also particularly careful to keep the men fit during the long halts, running exercises of the nature of games being the chief method.

Another very important factor is regimental *esprit de corps*, and there are many battalions where the tradition that the men of such and such a battalion never fall out has kept men in the ranks. On the other hand, this spirit may lead to trouble, as men have been known to march until they have fallen down in the ranks rather than fall out. Music is well known not only for its effect upon cadency but as a real stimulant. The confidence of men in their leaders has often a striking effect, and the devotion of Stonewall Jackson's men is a modern instance of this. To march to the sound of cannon is inspiriting; on the other hand, there are depressing influences to be thought of, such as the sight of stragglers from units in front, and in the Franco-German war the Germans took particular care to remove such men as soon as possible.

I come now to consider actual instruction in marching, which is the most important factor of all. A man may be in first class training and yet not be able to walk in the most economical manner, and again, a man may be an excellent walker and yet unable to march satisfactorily when loaded. As in all physical education, efficiency can only be achieved by actual practice, and training in marching should be begun as early as possible in the soldier's career. The progression of the training should be not merely in the length of the march but also in the weight carried, and this last is a point that does not always receive the attention it deserves, as it is rare to find men being exercised carrying full loads, including their ammunition. Many factors in marching are largely dependent upon military considerations, such as the design and weight of the load carried, and also the pace, the halts, food supply, etc.

A study of marching from a medical point of view enables one to point out the most advantageous ways of arranging these factors, but at times everything must bow to military considerations. I will proceed to indicate how these factors may best be dealt with to produce the most efficient marching, not forgetting that exceptional circumstances require exceptional treatment.

As regards clothing and accoutrements, all interference with the movements of the chest and with the dissipation of heat should be avoided as far as possible, and these points must be remembered in designing both. Perhaps the most important articles of clothing are the soldier's footgear, and from personal experience I can say that the ammunition boot, if properly cared for, is a very serviceable article. There is one criticism I should like to offer about this boot. The quarter does not appear to come high enough up the ankle, and when putties are worn it is sometimes difficult to fix them round the top of the quarter, with the result that there is a tendency for the puttie to slip up, leaving a space between the top of the boot and the bottom of the puttie. Badly-designed accoutrements will greatly interfere with efficiency. The weight carried should be distributed symmetrically and placed as near as possible to the centre of gravity of the body, but it must be remembered that the heaviest piece of the soldier's equipment—his rifle—must always be carried asymmetrically on one side or other of the body.

From personal experience I consider the present British web equipment to be the best equipment known.

As the amount of energy expended on a march is directly proportioned to the total weight transported by the men, it is most important to keep the actual load as light as possible. It has been laid down that only one-third of the total body weight should be carried, and this would seem to be a very sound rule. The official weight the soldier at present has to carry is 59 lb. odd, which includes his clothing. If we take 10 st. as the weight of the average soldier, then he is expected to carry 12 lb. over the third of his body weight. I have worn the web equipment on two separate experimental marches; in the first march on Salisbury plain I carried a weight of 51 lb., and the party covered 137 miles at an average of 12½ miles per day; on the second occasion the march took place round Dartmoor, and I only carried 39 lb., the party covering a distance of 162 miles at an average of 14¼ miles per day. The difference in weight is accounted for by the fact that no ammunition was carried on the second march. Looking back on these marches, I have no hesitation in saying that the second march, even with its greater average distance, and much more hilly terrain, was child's play to the first. I feel certain that many men will be found incapable of carrying the present load and that the weight must be lightened in some way or other, so that the load carried

should be little more than 47 lb., or one-third of the 10 st. man's body weight. If not, the best part of the marching power of our troops will be absorbed in bearing the weight of their packs.

On an ordinary march the amount of food carried is immaterial, and, indeed, any well-nourished man should be able to march twenty miles or more without eating, but it is essential that he should start in the morning with a good breakfast. During marching over long periods the food question becomes extremely important, and the problem of proper feeding on such marches will be simplified with the introduction of travelling kitchens. With regard to water, since the regulation of body temperature under ordinary marching conditions is affected far more by evaporation of moisture than by any other factor, it is imperative that water loss on the march should be replaced, and the contents (1¾ pints) of our present pattern water-bottle should be sufficient to do so for the ordinary march of fourteen miles in a temperate climate. Nothing conduces to efficiency in marching more than the maintenance of a regular pace. This applies not so much to the pace of the individual as of the unit, and this again depends primarily on the size of the column. Different nations require to march at different paces. During the march from Kabul to Kandahar, "when the Highlanders led the column, the Gurkhas were worn out by their efforts to keep up, and when the Gurkhas were in front the pace became generally so slow as to fatigue the Europeans and Sikhs."[7] The greater the force of troops marching together the greater will be the difficulty and fatigue involved in covering a given distance, and so the larger the force the more necessary is it to enforce march discipline. Further, the regularity of the pace is affected by the nature of the country traversed.

As regards the time of starting, if the weather be at all warm it is, of course, important to make the best use of the morning hours, but it is almost equally necessary to avoid the other extreme of a start so early as to interfere with the men's rest and their morning meal. The march is interrupted by periods of rest, termed halts, the number, distribution, and duration of which are most important. The short halt soon after starting to enable men to adjust their equipment and to attend to the calls of Nature should never be neglected. The hourly halt may be looked upon merely as a punctuation to break the monotony of the march, but the long mid-day halt is on an entirely different footing. When the men have plenty of time to rest, it should be made as complete as possible, all weights being taken off and the men encouraged to lie down; in no other way can they rest all over. This was the practice of Craufurd's Light Division in the Peninsula, and Stonewall Jackson always liked to see his men lie down, saying, "A man rests all over when he lies down."[8] It is just as necessary to break a long march by intercalating days of rest as it is to have rest periods during the daily march, and unless such rest days are arranged for, troops will be knocked up very soon by what becomes a chronic forced march. The tendency to move troops at night means loss of sleep, and if continued becomes a very serious factor, as nothing makes men so "jumpy" as want of sleep.

The billet is better than the bivouac, for, as Von Schellendorff says, "the better the troops are housed the more perfect will be their rest";[9] and Von der Goltz considers that a few bad nights passed without necessity in the open "may well do as much harm as an unfavourable action."

Lastly, we come to the effect of external conditions. Since evaporation is the chief means by which the body of a marching soldier gets rid of the heat generated by the work he is performing, the degree of relative humidity in the air becomes a most important factor, which may be fairly safely gauged by reading the wet-bulb thermometer. On service special precautions should be taken whenever the relative humidity appears high. Evaporation from the body is also affected by the fact that, as the men have to march in large groups, the actual relative humidity around them is raised. Every means should be adopted of increasing the available evaporating surface, coats should be opened, and, if military exigencies allow, the men should march with open ranks. Rain and a head wind will impede troops marching, the former by adding to the weight to be carried and the latter by actual resistance. Roads slippery from frost or greasy mud add enormously to the difficulties of economical progression. Napoleon described the fifth element as "mud"; but in the East it is more often dust and sand with which troops have to contend, the former affecting the men rather by increasing their thirst and causing discomforts than by impeding their movements. Apart from the state of the roads, the kind of country to be traversed has to be considered; valleys and country heavily wooded prevent the free circulation of air, and many of the deep lanes of England offend in the same way. The most important factor of terrain is the ratio of ascent to level. Besides the actual extra work entailed in ascending in a hilly country, it must be remembered that since the men shorten their pace in ascending and lengthen it in descending, the result upon a column of men is a series of harassing checks.

It is important that the staff arrangements dealing with logistics should be efficient, since "a soldier's fatigue is caused less by the fact of his having travelled a certain distance than by the length of time he is kept under arms." Here the soldier is also dependent upon his commanding officer; as Lord Wolseley has said, "fussy and fidgety commanding officers are prone to turn their commands out earlier than necessary";[10] and upon such apparently insignificant details the success of a march may depend. I have endeavoured to indicate the more important factors affecting the marching powers of troops, but in such a short paper on so wide a subject it has been impossible to enter into detail. It is a subject worthy of study by medical officers, and I hope the remarks I have offered will serve as a basis for a helpful discussion.

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DISCUSSION.

Colonel DAMER HARRISSON, K.H.S., A.M.S. (T.F.), President of the Section, opened the discussion by congratulating Captain Dunbar Walker on having chosen a subject which was of such general interest to all officers of the Regular and Territorial Army. The fact that men unable to step out at their own pace speedily became fatigued had recently been scientifically explained by Professor Macdonald's researches in the physiological department of the University of Liverpool. These investigations had shown that in order to walk comfortably the flexor and extensor muscles of the thigh must be completely relaxed between each pace and that this could only take place when a man was using the length of stride which suited his length of limb. If he was obliged to step short the muscles could not relax fully and he soon became fatigued.

Major-General W. LINDSAY, C.B., D.S.O., commanding the West Lancashire Territorial Division, said that he was rather in the position of a humble learner, because he was and had been throughout his service a mounted officer, so that the endurance of the infantry soldier had not come under his close personal observation when he was holding junior rank—that is, at the time when he would really have learnt the minutiae of the matter. As the commanding officer of a Territorial division he was much interested in the discussion. The Territorial infantry soldier suffered from nearly all the disadvantages touched on by Captain Walker—bad boots, youth, want of practice in marching, etc. Had the discussion taken place a month hence, after he had seen the behaviour of his young soldiers, he might have had more points to bring forward. He had, however, learnt much from the excellent paper which he had just heard.

Surgeon-General W. BABTIE, V.C., Deputy Director-General, Army Medical Service, said he would like to make a few remarks on some of the points raised in the paper. The first of these was in regard to age. Captain Walker had quoted Napoleon's saying that "men and not boys" were wanted, and had also referred to the good service of the reservists in South Africa. While agreeing with the

latter remark it must be remembered that the conditions of service obtaining in South Africa were not likely to be reproduced in a European war, as in this case mobilization would be rapidly carried out and the reservist would be at the front in a very short time without having time to become accustomed to active service conditions. He therefore thought that the age of the soldier was of less importance than his training, and that a youth of 19 who was in full training would be better than a reservist of, say, 27 who had followed a sedentary occupation for a couple of years after leaving the colours. When training for marching it was important that the full load should be carried, for the equipment had been designed to ensure correct balancing of the service load; if, then, any component—for example, the ammunition—were not carried the balance was destroyed, and the training lost much of its value to the soldier. With reference to flat-foot any acquired form of flat-foot was a serious hindrance to marching, and would render a man unfit for soldiering. On the other hand, among agricultural labourers it was not uncommon to find a form of flat-foot which in no way interfered with walking. This was a point for the medical examiner of recruits to bear in mind. Captain Walker had referred to *esprit de corps* as a factor in preventing men from falling out. It was quite open to question whether in many cases this *esprit de corps* did not result in more harm than good. In some corps in which this feeling was strongly developed, no men would fall out for perhaps the first three days of a march—all struggled on in spite of minor ailments. At the end of the third or fourth day a large number of men—say, 15 per cent. of the unit—would be obliged to fall out, and would remain incapacitated for some days, thus suddenly crippling the fighting force of the unit. He thought that the proper *esprit de corps* was that which taught the men to keep themselves fit for any duty, and that one of the most important points which should be impressed on the men was to recognize and take steps to remedy any minor ailment at once, before it had become a serious one. Music had been referred to as an aid to marching, but Mr. Fahey, an old soldier, in one of his recent articles in the *Journal of the Royal Army Medical Corps*, had pointed out that on a rough road or going uphill music only worried the men, as they could not possibly keep step in time with it. The most important factor affecting the marching of troops was the weight carried, and they must be prepared to do one of two things, either reduce the load to the soldier's carrying capacity, or so train him that he would be able to carry without undue strain the weight which it was essential to his efficiency he should carry on his person. It was hardly necessary, in Liverpool, at the time of the summer meeting, to insist on the importance of weight carried, for if any of them happened to visit Aintree they were not likely to back the horse carrying the top weight, unless they knew that it had been trained to carry this weight. Training was really the point, but not the whole point, for if the soldier was overloaded he would be tempted to get rid of some of his load by throwing away the things he thought he could best spare, and naturally the first of these was his ammunition. They ought also to be able to state in exact terms how the extra weight affected his efficiency as a soldier, but so far no one had been able to devise a formula for this, since the factors were too many and too complex.

Mr. T. S. ELLIS (Gloucester) urged the importance of marching with the feet in a position according with their physiology. Walking was really the movement of a heavy body over a hinged base, the hinges being at the knee, at the ankle, and at the heads of metatarsal bones. These hinges should be arranged transversely to the line of movement, and not obliquely, as happens when the toes are everted.

Colonel ADAM, Commanding the North Lancashire Infantry Brigade, drew attention to the value of cross-country running in light clothing as an adjuvant to route marching under service conditions. Most recruits joined the army at about 18 years of age—often in a badly nourished condition; but a man could not be regarded as fully grown till he attained the age of 25. During the intervening years his physical development along natural lines, and free from the restraint of military postures, should be aided as far as possible. In regard to weight carried, in South Africa a great mistake was made in serving out 6-lb. tins of "bully beef"; these were speedily thrown away on account of the extra weight which one man had to carry. In regard to dress, it was important that in a hot country the helmet should shade the man's face; if not, he got sunburnt, and at night his face smarted and he could not sleep. The high collar of the jacket should be done away with and a rolled collar substituted. Cigarette smoking should be discouraged in every possible way by commanding officers.

Captain DUNBAR WALKER, in reply, said that he objected to the puttie owing to the injurious effects of unevenly distributed pressure. The puttie could certainly be put on carefully and the pressure would then be evenly distributed, but if breeches with continuations, as worn by all native troops, were introduced the objections would probably be removed. With regard to the weight carried by the soldier in days gone by there was very little information. According to Fortescue the load of a grenadier in 1762 was 63 lb. 3 oz. In the Peninsular war the Light Division during their march to Talavera carried between 50 lb. and 60 lb., but this fact had been disputed. In the old days the men certainly carried more in the way of shelter and food, a blanket, and very often three days' rations, being included in the weight of the knapsack, but it must be remembered that the pouches contained only sixty rounds of ammunition. It was the large number of rounds now carried which was the determining factor of the total weight burdening the soldier. Surgeon-General Babtie had emphasized the tendency of mechanical transport to increase the distances required to be covered by the men. It might, however, be used to render them assistance. Mechanical transport occupied considerably less road space than horsed vehicles, hence extra wagons might be provided to carry part of the men's packs or some of the ammunition. Music must certainly be used judiciously, for, as had been pointed by Dr. Leitenstorfer, harm might be done if, as frequently happened, men were called to attention and ranks closed while, with band playing they marched through the narrow streets and over the cobble-stones of some village or town. With reference to Mr. Ellis's observations, if one considered the movements of the centre of gravity of the body, an explanation would be found of the natural tendency to turn out the feet slightly during walking. In marching the weight of the body was constantly being transferred from one foot to the other, and as a consequence the centre of gravity had imparted to it a swaying motion in a direction at right angles to the line of progression. When both feet were on the ground (period of double support) the centre of gravity was vertically above the line of progression, but immediately the weight of the body was supported entirely on one foot (period of single support), say the right, and this supporting leg was vertical, the centre of gravity moved sideways to its maximum distance (12 mm.) on the right of the line of progression. As the left leg passed to the front the centre of gravity gradually swung to the left. If the left foot were placed on the ground with its long axis parallel to the line of progression, the resultant direction of motion of the centre of gravity would pass obliquely across the foot. If, on the other hand, the foot were slightly everted, the long axis of the foot would lie directly in the line of motion of the centre of gravity. This produced a much more stable equilibrium. The spread of the feet was all the more necessary when the momentum of the centre of gravity was increased by the presence of a load on a man's back. Only the other day Mr. Tubby, at a meeting of the United Services Medical Society, when speaking of walking, made the following statement:

> The inner borders (of the feet) should make an angle with the median plane of not more than 25 degrees.

He agreed with Colonel Adam that when a recruit joined, the first thing required was that the man be well fed; indeed, senior medical officers would like to see a recruit do very little work for at least three months. Cross-country running, to which both General Babtie and Colonel Adam had alluded, was an excellent form of exercise, especially when carried out under arrangements such as were described by Captain Kentish in a recent number of

the *Army Review*, but, as General Babtie was careful to point out, nothing could really take the place of actual practice in marching itself. There was no doubt that by training, *the thirst of habit*, as pointed out by Colonel Melville, could be largely eliminated, but in the case of *the thirst of necessity* one was dealing with Nature's expression of the system's demand for water lost from the body by evaporation, and this must be replaced. During a forced march careful attention to this point was necessary, and in the German Field Service Regulations, and in our old "Combined Training, 1905," instructions were given as to the advisability of sending on word to the villages through which the column was to pass to have by the roadside buckets of water, etc., so that the men could replenish their supply. As regards preparation of the feet, on the Continent foot-cloths, which were an excellent form of foot-covering, were in general use. It must further be remembered that a dirty foot was an unsound foot. Solutions had been recommended for bathing the feet, such as a 10 per cent. solution of chromic acid—which, however, must be weakened if the feet were excoriated—or a 30 per cent. solution of formalin. On the marches to which reference had been made in his paper, a powder employed in the German army was used, consisting of salicylic acid 3 parts, talc 87 parts, starch 10 parts. It appeared to be an excellent recipe.

A SUGGESTION FOR THE MORE GENERAL USE OF IODINE IN FIRST-AID TREATMENT OF ACCIDENTAL WOUNDS.

By A. G. WILDEY,
Fleet Surgeon, R.N.

THE use of an alcoholic solution of iodine for sterilizing the skin, both before and after surgical operations, is a method very widely adopted, and as a routine practice is thoroughly satisfactory. The immediate application of such a solution to all accidental wounds, from simple abrasions to compound fractures and penetrating wounds of joints, is less generally recognized as one of the most simple and reliable means of avoiding sepsis and of preventing tetanus.

The experience gained during the past eighteen months in the Surgical Section of the Royal Naval Hospital, Chatham, convinces me that in this solution we have an invaluable form of treatment. During this period all compound fractures have been thoroughly flushed out with the tincture, or with a 2 per cent. solution of iodine in rectified spirit, as soon as possible after admission. Many of these cases have been exceptionally severe. They include compound comminuted fractures of the skull and many crushing injuries to bone and joint caused by machinery accidents, both afloat and in the naval dockyard.

The results have been surprisingly satisfactory, sepsis being practically unknown. Particularly noticeable is the aseptic course in cases of badly crushed hands and feet—cases that under other methods of treatment are so commonly followed by septic trouble.

Very gratifying results have been obtained in minor injuries occurring in H.M. Dockyard, Chatham, where the application of iodine solution to all accidental wounds is a routine practice. Fleet Surgeon Bradshaw, the senior medical officer of that establishment, has kindly permitted me to quote some of his statistics. His returns show a decrease of over 26 per cent. in the number of cases placed on the hurt list in the year 1911 as compared with 1910, although the cases of minor injury receiving treatment but not placed on the hurt list totalled nearly 10 per cent. more. The routine of immediate iodine application had been in use for only nine months of the year 1911. To this treatment a large share of the credit for the decrease in the number of cases requiring to be placed on the hurt list must be given for the immunity from septic sequelae it has secured. When we consider the fact that a total of 14,961 cases of injury were under treatment during the past year, and that wounds formed the great majority of them, it will be conceded that we are not drawing conclusions from insufficient material.

The bactericidal action of iodine in alcohol and its value as compared with other antiseptics has occupied the attention of many able investigators. The questions as to how far the efficiency of the treatment is due to direct bactericidal qualities of the iodine, to the penetrating powers of the alcohol, to the astringent action of the combined drugs, or to the stimulating effects upon the phagocytes, are outside the purport of this paper, which aims at emphasizing the practical advantages of the method in all first-aid dressings. One has only to remember the terrible sequelae which too often follow the most trivial abrasions to realize how urgently we need some simple non-poisonous application which can be safely used as a domestic remedy. How frequently do we find tetanus a fatal termination to apparently insignificant injuries! The football-player and the cyclist too often fall victims to this, the most appalling of wound infections; and yet we have in iodine solution, if promptly applied, a ready means of prevention.

Unfortunately, it appears to be a popular conception that iodine, since it is labelled a "counter-irritant," must in any form of application produce irritation; and so generally held is this idea, that many practitioners hesitate to apply iodine to an abraded surface, and few fail to show some astonishment, and even alarm, when it is suggested to them that compound fractures should be freely drenched with a tincture so long associated with the production of some degree of inflammation. In practice, however, we find the 2 per cent. alcoholic solution free from all harmful consequences. Deep wounds and compound fractures, after preliminary cleaning, are well swilled for a minute or so with the solution, and then thoroughly washed out with saline solution.

In cases of sutured skin wounds, abrasions, blisters, and local injuries of minor degree, the iodine is allowed to dry on, and in these superficial injuries it is often unnecessary to apply any dressings, an occasional reapplication of the solution being all that is required to keep the part dry and aseptic.

In my experience of this method of treatment symptoms of iodism have never occurred. The usefulness of the solution extends beyond its application to injured tissues. It forms a ready means of sterilizing the hands of the operator or dresser in emergency work. Wooden, porous, and plaster of Paris splints, where they are unavoidably exposed to some soiling from discharges, can be kept apparently aseptic by daily paintings with iodine. It is difficult to over-estimate the value of this in practice in cases where the reapplication of splints or other fixation apparatus may be an exceedingly troublesome and possibly disastrous undertaking.

In advocating iodine solution as a local application for general use by all intelligent enough to render first aid, some of its many advantages over the more commonly employed antiseptics may be emphasized. Its distinctive colour and general properties make it almost impossible to be confounded with other drugs. It is practically non-poisonous. It is conducive to a more general adoption of a "dry" treatment of wounds, and its use as a domestic remedy must tend to abolish the wet rag, the bread poultice, and all the other sodden and septic household dressings.

For first-aid work, military, naval, or ambulance, iodine is the ideal antiseptic. To get the best results the solution should be freshly made, and this is the chief difficulty connected with its more general use, and particularly with its use in the field.

In the Royal Navy iodine is being supplied dry, in tubes, to be dissolved in alcohol as required. This, while suitable to the service afloat, is not thoroughly practicable for field or ambulance work, nor is it handy enough for popular use. Some method by which a glass capsule or a glass tube containing a strong solution of iodine can be quickly crushed within a vessel containing a sufficiency of alcohol, thus forming immediately the required 2 per cent. solution, would satisfy most requirements; and if this vessel be a collapsible tube holding a quantity sufficient for one application, the fact that a collapsible tube permits the contents to be forcibly expelled is an additional advantage.

These tubes can be carried like cartridges in a bandolier. When the 2 per cent. solution is required the glass capsule contained within the collapsible tube is broken by moderate pressure of the finger and thumb, the strong solution is

released to mix with the alcohol which is free in the tube. The capsule should have a thin gauze wrap to retain fragments of broken glass and so to prevent them from blocking up the nozzle of the tube. The iodine being freed only when it is required for use, the corrosive action of iodine on the metal does not occur.

A bandolier and belt fitted for these tubes and for the service pattern sheathed hypodermic syringe and rubber capped bottles for various hypodermic solutions has been made to my design,* and may perhaps prove a useful addition to the equipment of a medical officer in the field or in general ambulance work. An efficient and very economical method of applying iodine solution is by means of a spray producer. For hospital work an ordinary throat spray apparatus will be found to effect a surprising economy of solution, since there is no wastage in swabs, etc. For field and ambulance work a special spray producer, with metal bellows, has been designed† to be carried hooked to the waist belt.

No doubt more simple methods for preparing and for carrying the solution will be suggested when its general utility becomes more widely recognized—when all who may be called upon to render first aid and all whose occupation or recreation daily exposes them to the risk of accidental wounds will demand to have this antiseptic ready to hand in a convenient form—in a form that is practically harmless, yet a powerful antidote to that most dangerous source of sepsis—the domestic first-aid dressing—the wet pocket-handkerchief!

DISCUSSION.

Colonel Damer Harrisson thanked Fleet Surgeon Wildey for having drawn attention to the value of iodine in first-aid work.

Lieutenant-Colonel R. Jackson said that up to the present he had always relied on mercury biniodide as an antiseptic in the treatment of accidental injuries, and had been quite satisfied with the results obtained. He had used iodine for sterilizing the skin but had never used it in the interior of wounds.

Mr. T. S. Ellis (Gloucester) said that the old household remedy of covering the wound with a piece of clean linen and placing a layer of linen dipped in turpentine over this, and wrapping brown paper round the whole, yielded very good results; in fact, he did not think that one made enough use of paper as a first-aid dressing.

Fleet Surgeon Wildey, in reply, said that while he admitted the antiseptic properties of mercury it must be remembered that mercury was extremely poisonous and could hardly be allowed in ordinary households on the off-chance of an accident occurring. To illustrate the value of iodine he quoted a case in which a man, while employed in coaling ship, sustained a severe compound fracture of the thigh, the ends of the broken femur were protruding and particles of coal were embedded in the bone. The surgeon on duty immediately drenched the parts with a fresh 2 per cent. alcoholic solution of iodine and sent the man to hospital, where a Lane's plate was applied and the wound closed; this healed by primary union and the femur became united as if the case had been one of simple fracture. To avoid the trouble of making fresh solutions of iodine the liniment could be diluted to 2 per cent. strength; this acted in a satisfactory manner.

EYESTRAIN IN THE ROYAL NAVY:

WITH REFERENCE TO GUNNERY AND OTHER RATINGS.

By W. A. Whitelegge, M.D., B.A.,
Fleet Surgeon, R.N.

This subject is an intensely interesting and important one, but I am afraid that the remarks which I shall make on its causes and effects must necessarily be brief.

Asthenopia, or eyestrain, is defined as a symptom or group of symptoms, the result of straining some part of the visual apparatus. The varieties of eyestrain are:

1. Ciliary strain, or strain of the ciliary muscle.
2. Muscular eyestrain, or strain of the extrinsic muscles of the eye, as the recti.
3. Retinal asthenopia, or strain of the retina, *retinal tire*.

Ciliary strain is due to relaxation of the strained ciliary muscle, and this may be due to prolonged use of the eye, such as gazing at small objects in a bright light, or from the use of microscopes, telescopes, range finders, or binoculars. In using any of these instruments, the ciliary muscle is thrown into a state of contraction, followed by exhaustion and dilatation. This contraction may also be due to irritation of the conjunctivae from particles of dust, irritating gases, and exposure to the wind causing watering of the eyes. Spasm of the ciliary muscle accompanied with a contracted pupil from associated spasm of the sphincter of the iris, caused by direct or indirect irritation of the third nerve, may be due to the use of powerful telescopes or strong magnifying glasses. In powerful telescopes the field of vision is small, and although there is magnification of the object looked at, there is severe strain thrown on the ciliary muscle.

Muscular Eyestrain.—This condition is due to strain of the extrinsic muscles of the eye, and may be caused by the use of the eye in range finders, giving rise to symptoms of heterophoria. I will allude to its causes when dealing with range finders.

Retinal Eyestrain.—Strain of the retina and its connexions. The main cause of this is "glare." We are all familiar with the uncomfortable sensation when a bright light shines directly into the eyes, making us "blink"; and, again, with the sensation of sneezing when we suddenly pass from a dark room into bright sunshine. The uncomfortable "glare" from the surface of the sea, or from roads in bright sunlight, is well known. It is experienced in countries where the surface of the ground is white and the atmosphere clear; it is met with in the arctic and antarctic regions, from snow. It is not necessary to have light shining in front of the line of vision to experience eyestrain from glare; in fact, the light may be directly behind.

Under artificial conditions the most severe form of glare is experienced when a bright light is situated in a direct line between the eye and the object observed, such as when we meet a brilliant acetylene lamp on, say, a motor car, shining into our eyes.

The eye is extremely sensitive to extremes of illumination, and adapts itself to them (retinal adaptation). For instance, small print may be read by the light from a match or in strong tropical sunlight without any difficulty.

In ordinary natural circumstances glare is caused by strong reflected light upwards into the eye from the surface of the ground or from the surface of the sea, and this is increased by the use of glasses or telescopes, thereby flooding the retina with diffuse light, which is detrimental to acuity of vision.

In ordinary conditions it is diffuse light which enters the eye, because the sun or other source of light is above the observer; and the eye is protected from the direct rays by the eyebrow, the eyelids, and headgear. With telescopes, the eye is protected from direct rays by the india-rubber eye-piece in heavy guns, and with the ordinary telescopes by the eye fitting close to the obturator.

When looking at a target in bright sunlight the reflected light obscures the contrast between the target and the surface of the sea, and the lower the angle of incidence of the rays the more difficult it becomes to see the target clearly.

Again, reflected rays fall on the retina in the neighbourhood of their image, and thereby diminish the sharpness of vision and give rise to the condition known as diffusion. This diffusion exists in every eye, and we become aware of it when looking at small distant objects for a length of time.

The eye has a regulator against the influence of light in the iris, which acts as a diaphragm, thus diminishing the size of the pupil aperture when the rays of light are increased; but the function of the iris has a limit, and cannot act as a shutter in a camera. In other words, the power of the iris is not sufficient to prevent the bad effects of superfluous illumination in the retina which follow exposure to bright light.

When the iris is insufficient to prevent the intensity of incident light we experience glare, and in extreme cases

* Made by Messrs. Down Brothers.
† Made by Rogers, Strand, London.

changes in the retina. These changes, believed to be chemical changes in the visual purple, cause loss of function and even destruction of the structural elements, and it is debatable whether the intensity of light or some form of energy in the incident rays is the cause of glare. In my humble opinion it may be due to both.

The ultra-violet rays are believed to effect chemical changes in the retina, and much attention is now being given to the real function of these rays. It is generally accepted that very few, if any, of these rays enter the eye fundus, as they are absorbed in the crystalline lens, which acts as a protector.

In considering the symptoms of the eyestrain due to "glare," discomfort is met with in the milder forms which, if prolonged, causes pain. This is due to screwing up of the eyes and puckering up of the brows, and this prolonged contraction is in itself painful. Parsons, in an article on the physiology of the eye, says "that puckering of the brow is specially liable to cause pain by squeezing the supra-orbital nerve against the frontal bone."

Painful impressions induced by stimulation of one branch of a nerve are liable to spread and be referred to other branches of the same nerve. Hence it is that pain is referred to many other areas supplied by branches of the fifth cranial nerve—the iris, ciliary body, and choroid. The pain may also be due to intense constriction of the iris or to irritation of the sensory nerves of the cornea or choroid.

In acute forms of eyestrain from "glare" pain is the principal symptom complained of, and comes on after a certain time, especially when using a telescope in a strong light when the sun is low in the sky, at from 15 to 20 degrees, that being the angle which admits a large number of reflected rays into the eye.

Among motor drivers eyestrain is well known, especially after a long drive on a dusty road facing the sun, the reflected rays consequently shining into the eyes of the driver. Night blindness is known to have followed in several instances.

Range Finders.—There is no doubt that range finders do produce eyestrain, and I have gained this information from many officers in the army and navy who have had very considerable experience in using these very delicate and powerful instruments.

To take the "Barr and Stroud" range finder as an example. In this form of range finder both eyes are in use at the same time, and looking through different power lenses. This gives rise to strain in the ciliary muscles, and at the same time in the extrinsic muscles which are all engaged. In addition there is the vibration of the ship, which puts a certain amount of strain on all the muscles of the body, the movement of the ship, the long ranges, reflection of light from the surface of the sea, "glare," and the speed of the ship, all of which tend to strain the eye and give rise to various forms of discomfort, distress, and other phenomena.

The following are some of the symptoms met with in this form of eyestrain: Pain in both eyes and sensation as if the eyes are being "dragged apart," pain in the eyeball, headache, photophobia, mistiness, double vision, difficulty in seeing objects with one eye closed, exophoria, esophoria, and hyperphoria, inability to use an ordinary telescope or binoculars—all these sensations may last for a considerable time, and cause great distress.

In regard to this form of eyestrain, I think that it is due to strain of the internal and external muscles of the eye, and that "glare" from a physiological standpoint may be ignored, or at any rate is not the main factor in causing the eyestrain.

The range finder is one of the most interesting as well as one of the most essential of optical instruments used in modern gunnery. I have already mentioned the various forms of heterophoria or muscle-balance errors that may arise from its use. These muscle-balance errors are:

1. Exophoria—the eyes turn outwards; due to insufficiency of the internal rectus.
2. Esophoria—the eye turns inwards; due to insufficiency of the external rectus.
3. Hyperphoria—one eye tends to be on a higher level than the other; due to insufficiency of the superior or inferior rectus.

Now insufficiency of a muscle due to relative weakness means that a particular muscle is relatively weaker than its opponent, so that in "static" and "dynamic" vision extra impulses have to pass to that muscle in order to produce perfect vision. An insufficient muscle is not necessarily weak. It is insufficient because its opponent, through spasm or preponderance, is "too efficient." Hence, in the case of insufficiency of the internal muscles, although they may be insufficient for convergence, they may be able to take their part in associated movements of the eye to either side.

In range finders there is a tendency to produce this condition, and on testing with a Maddox rod this is easily demonstrated.

Many of these muscle-balance errors arise from the use of range finders, and the eye which is looking at distant objects is generally affected, causing double vision, which may only last for a short period, or may be permanent. These errors may be mistaken for accommodative asthenopia, squint, nystagmus, etc.

Now in esophoria there is insufficiency of the external rectus, due to spasm or preponderance of the internal rectus, and this is what gives rise to the sensation known as "dragging apart" of the eyes, so often met with in those who use range finders for a time.

Another symptom is that when testing with Harman's diaphragm test, the letters are said to be "dancing about." This condition was admirably described in a paper on cases of esophoria not caused by refractive errors, in the *Lancet* of October 23rd, 1910, by Mr. Reginald Morrell.

I came across a case on April 25th of the latter form of esophoria in a leading seaman, gun-layer second class, aged 29.

Vision for distance with Snellen's test types, R.V. $\frac{6}{6}$, L.V. $\frac{6}{6}$. Retinoscopy: no error of refraction, media clear, fundus normal. Tested with Maddox rod, esophoria, with Harman's diaphragm test, the letters were "dancing about." He had no pain, but when reading for some time his eyes got tired, and the letters jumped about. He attributed this to using a range finder some three years ago; he used the right eye for shooting. The "dancing about of the letters" was relieved by placing a convex lens −1.50 D. sph. in front of the left eye.

It may be argued that this was a case of early presbyopia, but as only one eye was affected, and that eye was not the "master eye," which I think, as a rule, shows signs of presbyopia earlier than the eye not constantly used, I do not think so. There was no visible nystagmus and no history of any nervous affection. If this had been a case of "retinal tire," the letters would not be "dancing about." I might also mention that there was no history of alcoholism.

The differences in the lenses in a range finder undoubtedly give rise to eyestrain, and account for nearly all the phenomena and inconvenience which prolonged use of these instruments are prone to cause. The heterophoria from the use of range finders is most interesting from a clinical point of view, and the strain on the internal and external muscles of the eye must be very severe. For all who use range finders and have had much practice with these instruments, it is necessary to warn them of the distress that is liable to follow, not to mention the various sequels. The adjustments necessary for binocular vision are practically impossible when using a range finder. But there must be an inequality in the two eyes, and the effort to produce binocular vision may easily give rise to central symptoms, which are nearly always functional, such as headache, sickness, sleeplessness, migraine, and a symptom generally not noticed—polyuria.

I have already alluded to muscle-balance errors, such as heterophoria and strain of the ciliary muscle.

The principal troubles arising from the use of range finders may be divided into peripheral and central. In the former, pain at the back of the eye is one of the most commonly met with. Another is pain at the nape of the neck, which is often met with in cases of heterophoria, and in the majority of those who use range finders is the principal symptom complained of.

"*Eye.*"—In considering good shooting we have to take into account "eye." Robert Doyne in an article on "Eye in Sport," in the BRITISH MEDICAL JOURNAL of December 24th, 1910, offers some very useful information, and arrives at the conclusion that there is a "master eye," and that this is gained by experience.

Now in examining men's eyesight I have come across this "master eye," and therefore I entirely agree with

him, but the time at my disposal will not permit of going deeply into the subject. A "master eye" such as he speaks of can only be gained by long experience and training, entailing the most careful use of various instruments, but without good vision and constant practice this "master eye" cannot be acquired.

I will now refer to anisometropia in which the refraction is different in each eye. It is comparatively common among those who use telescopes and range finders for long periods—namely, signal ratings.

There is an analogous condition, often met with, where there is a difference between the acuity of vision in the two eyes not due to errors of refraction, changes in the fundus or media. It is due to the so-called "master eye."

I tested by means of Snellen's test types for distance twenty-five men in a clear light.

The following were the results of the examination:

All read $\frac{6}{6}$ at 6 metres in both eyes.
All used the right eye for adjusting the telescope.
3 read $\frac{6}{6}$ at 6 metres in both eyes. Hypermetropia.
1 ,, $\frac{6}{6}$ at 6 metres in both eyes. Hypermetropia.
6 ,, $\frac{6}{6}$ at 6 metres in the right eye, and $\frac{6}{9}$ in the left eye.
6 ,, $\frac{6}{6}$ at 6 metres in the right eye, and $\frac{6}{12}$ in the left eye.
5 ,, $\frac{6}{9}$ at 6 metres in the right eye, and $\frac{6}{6}$ in the left eye.
1 ,, $\frac{6}{9}$ at 6 metres in the right eye, and $\frac{6}{12}$ in the left eye.
2 ,, $\frac{6}{9}$ at 6 metres in the right eye, and $\frac{6}{18}$ in the left eye.
1 ,, $\frac{6}{12}$ at 6 metres in the right eye, and $\frac{6}{24}$ in the left eye.

Those who read $\frac{6}{6}$ in both eyes were hypermetropic, and by retinoscopy were not astigmatic. All the others had no errors of refraction.

The causes of eyestrain among gunnery ratings are:

1. "Glare" from the surface of the sea.
2. The use of powerful telescopes for prolonged periods.
3. The neglect of proper adjustment of the telescope.
4. Using the telescope with one eye closed.
5. Living in a ship in artificial light (electric).
6. Long-range firing (indirectly).

Modern telescopes, binoculars, and range finders are all fitted with high power lenses reaching as high as 35 dioptres, which in itself is a great strain on the normal eye, especially in a strong light.

The want of proper adjustment of the telescope or wrongly spaced binoculars is a very common error, and it is very difficult to impress on men the fact that in using high power glasses the eye can accommodate itself to a higher adjustment than is necessary, and the stronger the magnification the easier it is to increase the error.

With a view to remedying this error experiments were made with the telescopic sights marked in dioptres, so that men, having been given their correction for refraction, could adjust the sight accordingly; but these were not found to be satisfactory. The condition of light and the atmospheric changes were found to interfere with the supposed contraction, and the necessary adjustment of the telescope did not coincide with the correction for errors of refraction under all circumstances. It was found more satisfactory to instruct men to use their own correction when adjusting a telescopic sight.

Using a Telescope with One Eye Closed.—This is a very common cause of eyestrain, and it is very difficult to impress upon men its disadvantages. To prevent this, and to accustom men to keep both eyes open when using a telescope, a shade over the eye not applied to the glass would prove to be efficient, and tend to train the observer to prevent eyestrain from this cause.

Living in Artificial Light (Electric).—This is perhaps the most common cause of eyestrain among all ratings in the navy. In nearly all modern warships men have to live a considerable time in artificial light between decks. It is obvious that artificial light is absolutely necessary, and the electric light is found to be the most useful form of illuminant. The quantity of light is generally sufficient, but the distribution and situation of the lamps leaves much to desired. For instance, in many spaces there are no overhead lamps, and all light has to come from the bulkhead lamps, which are fitted at a height of about 4 ft. from the deck.

Overhead Light.—In mess decks, too, very often the principal illumination comes from lamps fitted into the sides of the deck, and there is little or no overhead light. This is obviously a frequent cause of eyestrain, as the light falls either in front of or behind the observer. To any one familiar with ship life the attitude assumed by men while reading by the aid of artificial light is sufficient to prove this.

Naked incandescent lamps are undoubtedly a cause of eyestrain. Every lamp should be protected with a shade, and Mr. Treacher Collins recommends the use of amber-coloured glass as the best form of shade to prevent eyestrain. Amethyst-tinted glass is equally efficient as a protector to the eyesight. They both absorb some of the ultra-violet rays, which are well known to cause eyestrain.

Lead-glazed lamps are also very useful. In all forms of lamp the filament should not be visible. The form of the filament plays a material part in the illuminating power, but should always be shaded.

The Effects of Eyestrain.

The effects of eyestrain may be divided into two groups: (1) the mild, (2) severe. (1) Mere dazzling, attributable to extra diffusion of light over the retina, producing discomfort and eventually pain. (2) Those which are more severe are due to intense bright light causing blurred spots, or "negative after-image," which is usually temporary, but may persist, and it is then known as a "scotoma." This may be followed by anatomical changes in the retina, pigmentation of the macula, night blindness, and, in extreme cases, actual blindness.

In my experience the cases of eyestrain are for the most part of a mild character, but the effects last for a long time. In many cases which I have come across the victim complains of pain in the eyes from reading, especially at night, and I can call to mind several where the effects of eyestrain are permanent.

I have refrained from giving astigmatism as a cause of eyestrain, and the time at my disposal will not permit of my dealing with it *in extenso*, but before concluding I should like to refer to this error as a cause of eyestrain, especially hypermetropic astigmatism, which is well known to give rise to asthenopia. This is greatly increased if the error is asymmetrical in one eye or unequal in both eyes. Myopic astigmatism, on the other hand, usually produces defective vision which is manifest.

It is a recognized fact that the larger the error the easier it is to detect astigmatism, and the converse is also true—namely, the smaller the error the harder it is to demonstrate and the more likely it is to be overlooked and the after-effects worse. Men suffering from eyestrain seldom show serious defective vision, as estimated by Snellen's test types, and therefore subjective symptoms are the indications for a searching examination of the eye.

THE TREATMENT OF SYPHILIS BY SALVARSAN.

By Lieutenant-Colonel NATHAN RAW, R.A.M.C. (T.F.)

LIEUTENANT-COLONEL NATHAN RAW related the clinical history of 15 cases in which he had used salvarsan by the intravenous method. As a result of his experience, he came to the conclusion that salvarsan was a most valuable remedy in the treatment of the disease in the primary stage. In the secondary stage very rapid improvement followed the use of the drug, whilst in diseases of the nervous system the result of syphilis salvarsan did not appear to be of much value. He had used it in the treatment of general paralysis, but had seen no favourable result; in fact, in one case he thought the disease was aggravated. He was of opinion, however, that a certain proportion of cases required mercury too for the cure, and he preferred to give injections of mercury after salvarsan had been used; he was strongly in favour of the inunction treatment by mercury, and for cases in the secondary stage of the disease this treatment seemed to be the best. There could be no question that salvarsan was a most potent and valuable remedy in the treatment of syphilis, but it was necessary to select cases which would be benefited by it, and he could not possibly see that any good would result in the treatment of congenital syphilis, or in those diseases of the nervous system such as locomotor ataxia or general paralysis, as in those cases permanent destruction of the nervous system had already taken place.

DISCUSSION.

Major D. SMART, R.A.M.C. (T.F.) (Liverpool), said that he had used salvarsan in 60 hospital cases and in 6 private

cases. He agreed with Lieutenant-Colonel Raw as to its beneficial effects on skin lesions, chancres, mucous patches, and rupia, but had not seen any benefit in old lesions of the nervous system. His experience had been confined to the intravenous method. Many surgeons complained of the difficulty experienced in inserting the needle into the vein; this difficulty, he thought, was due to using a blunt needle, and could be obviated by using a fresh needle for each case. Mercury must be employed in combination with salvarsan, and for preference strictly according to the Aix-la-Chapelle formula, as he considered this method to be far superior to the injection treatment.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

A CASE OF "THYMUS DEATH."

Early one morning in April of this year I was summoned to see F. H., aged 4 months, who was said to have been taken suddenly ill and to be dying. On arrival at the house I found the infant (whom I had known previously to be a perfectly healthy nursling) dead. He was not yet cold, there was no rigor mortis, the lips were markedly cyanosed, and some yellowish (blood-stained?) froth exuded from the nostrils. There were no other external signs of note.

The mother's story at the inquest which was ordered was to the effect that she put the child to the breast at 7.30 a.m., that he seemed perfectly well and played with her and her husband for a time; then while she was in the process of dressing him he suddenly stretched himself and gasped a little, and turned his eyes upwards. A neighbour whom she called in said she thought the child was dying or dead, and came for me. The mother stated on oath that neither she nor her husband went to sleep after she had fed the baby at 7.30 a.m.

By order of the coroner I made a *post-mortem* examination. On removal of the sternum and cartilages the thymus was seen to be greatly enlarged, concealing practically the whole pericardium, and extending nearly the whole length of the sternum. There was some excess of free fluid in the left pleural cavity, and the left lung was engorged with blood, as were the left pleura and lung, but to a less degree. There was no sign of pleurisy or pneumonia. The air passages were perfectly patent, no foreign matter being present. Examination of all other organs showed them to be normal.

The jury returned a verdict in accordance with my evidence, that death was due to the thymus enlargement solely, this being a recognized, albeit uncommon, cause of sudden death.

Stafford. A. E. Hodder, M.B., B.C.Cantab.

HYPOSPADIAS—AN UNUSUAL CASE OF GANGRENE.

The following case appears of interest, particularly with regard to the occurrence of an acute spreading gangrene commencing in the penis of a patient aged 45, the subject of hypospadias. At the first visit he complained of somewhat vague symptoms, including general malaise, occasional shivering, profuse sweating, and loss of appetite. There was no rise of temperature, and the pulse was normal. He admitted a fairly free use of alcohol for about a week previous, and as he appeared rather debilitated his present state was no doubt due in good measure to this. On the third day of attendance he complained of some difficulty in passing urine, also some smarting pain on the right side of the body of the penis. On examination, the patient was found to be the subject of hypospadias, the meatus being about ¾ in. in front of the scrotum and the organ rather under-developed. There was some swelling, and on the right side of the penis a small circular facet-like area with inflammatory reaction around. The urine contained some albumen, no sugar. The following morning there was much swelling of the penis, and around the small area referred to on the right side the tissues had become gangrenous. Very rapidly practically the whole organ became the seat of a spreading moist gangrene.

The abdominal wall was very soon invaded by the process, two large gangrenous areas appearing on either side about midway between the umbilicus and anterior superior spines. The abdominal discoloration reached eventually almost as high as the umbilicus in front. The spread on the lateral aspects was very extensive, reaching on the left side as high up as the axilla, and on the right to a level with the nipple.

The patient died on the morning of the fifth day from the appearance of gangrene. The temperature throughout was normal; pulse eventually very rapid and thready. Fluid from a large bulla on the lower part of the abdominal wall was sent for bacteriological examination. No micro-organisms of any kind were found by direct examination of stained films made from the fluid, and cultivation, both aërobic and anaërobic, failed to demonstrate the presence of any organisms. Bathing the surface immediately around the bulla with a lysol solution may have sterilized the fluid as it escaped, although this does not seem too probable, as nothing could be got even from direct films stained.

Kinlochleven, Argyllshire, N.B. J. G. McDougall, M.B.Ed.

Reports

ON

MEDICAL AND SURGICAL PRACTICE IN THE HOSPITALS AND ASYLUMS OF THE BRITISH EMPIRE.

CHURCH MISSIONARY SOCIETY'S HOSPITAL, AMRITSAR.

(Two Cases reported by Somerton Clark, F.R.C.S.Edin.)

Case I.—*Strangulated Infantile Hernia.*

The patient in the following case, a Sikh male child, aged 2 years 1 month, was admitted on March 26th, 1912, with a history to the following effect:

During the past eight months the child had had a swelling in the right scrotum which alternately ascended and descended. During the past ten days it had been constipated, and during the last five days it had had vomiting and fever.

The obstruction became complete twenty-four hours before the child was brought to hospital. The scrotum was red, heavy, and as large as a man's fist.

Operation.—An incision 3 in. long was made into the scrotal skin, which was much thickened and very vascular. The sac consisted of two distinct outer layers as thick as the leather and rubber of a football. The third layer was thin, and contained a loop of bowel firmly adherent to the testis and loosely adherent to the inguinal canal. When the adhesions to the testis were separated, a bare area the size of a shilling was exposed on the small gut, which was indurated. As invagination was impossible, 2 in. of intestine were excised, and the ends of the small intestine united with linen thread. The abdomen was filled with double saline solution. The sac was litagured and the ring closed after with two sutures. The pulse was barely perceptible and the lips pale, so double saline was given by the rectum and into both axillae.

Progress was uninterrupted, and the child left hospital on the tenth day.

Case II.—*Hydatid of the Neck.*

The patient in this case was a Mohammedan female, aged 16 years, who was admitted on April 6th, 1912. She complained of a swelling in the neck which was especially marked below the left sterno-mastoid. It had existed for two and a half years, and gave rise to dysphonia, dyspnoea, and dysphagia.

On April 9th, 1912, a transverse incision 1 in. long was made through the left sterno-mastoid, and on pressure hydatids escaped. On further pressure the mother cyst was invaginated and removed.

The cavity of the tumour extended behind the larynx and trachea.

The patient left hospital three days later, relieved of her symptoms.

Reviews.

ORTHOPAEDIC SURGERY.

IT is fifteen years since Tubby's *Deformities* was reviewed in these pages,[1] and during that time a good deal of progress has been made in orthopaedics, as in other branches of surgery, so that a new edition[2] is as necessary as it is welcome. Wisely, as we think, Mr. TUBBY has decided to follow American and Continental custom and include in orthopaedics those diseases of the bones and joints with which all orthopaedic surgeons have so much to do. This widening of the scope of the book has necessitated its enlargement, and accordingly it now appears in two volumes instead of one, and so much of it is rewritten that it might pass for a new book instead of a second edition. The first edition was arranged mainly on a regional basis, while in the present issue the subjects are grouped according to etiology and pathology. The book is divided into ten sections, and there are four appendices upon various subjects; but, unlike most German orthopaedic works, there is no section devoted to the setting forth of the principles upon which orthopaedic instruments should be designed and made, and no detailed consideration of the many materials that may be used by the surgeon in the course of treatment or the technique of their application. This is, we think, a pity, but Mr. Tubby is not singular among English-speaking surgeons in leaving out so much of the handicraft of orthopaedics. Surgeons in the great cities may perhaps leave these matters to the instrument makers, but instructions on the choice, preparation, and use of orthopaedic appliances of all kinds are desirable for readers who are remote from instrument-makers' shops. Mr. Tubby, like many others, states that Andry formed the word "orthopaedia" from *ορθος* and *παις*, but Andry distinctly states that he formed it from *ορθος* and the diminutive, *παιδιον*, following Claude Quillet, who in 1656 wrote a poem, *Callipaedia*, "upon the method of getting beautiful children." The point is perhaps microscopic, but it is as well to be accurate in etymology, since we heard a highly-placed member of the medical profession only the other day publicly give the derivation as from *ορθος* and *pes*, thus debasing orthopaedics to something akin to chiropody, whereas, as Mr. Tubby truly says, it "is no narrow speciality to be limited by the custom of one nation or another, but is a most important branch of surgical science, and worthy of the closest attention." The truth of this statement will be apparent to any one who merely glances at the 1800 pages contained in these two volumes, wherein not only the ripe experience of the author but the results of a very wide survey of British and foreign methods is set forth and their value appraised.

The short articles on cervical ribs and on torticollis are clear, and their conclusions sound, and the four chapters devoted to the much-debated subject of scoliosis contain as much as can usefully be written on the practical treatment of that subject, summing up the many and various views as to etiology and treatment. There is weight in the author's plea for a greater consideration in this country of mechanical correction of scoliosis, a form of treatment which has been carried to a great length in Germany and Switzerland, and is capable of giving good results. There is a very useful section on affections of muscles, tendons, bursae, and fasciae, and the five sections on diseases of the bones and joints occupy nearly two-thirds of the second volume. The author speaks favourably of Bier's hyperaemic treatment, and of tuberculin in surgical tuberculosis. These sections form an adequate treatise on their subject.

As was to be expected of one of the authors of the *Surgery of Paralyses*, the section on this subject is very complete and interesting. We note that a more favourable view is taken of the value of tendon transplantation than is held by some surgeons of experience.

The volumes are copiously and well illustrated. There are full indexes of subjects and of authors referred to, and the indexes to both volumes are printed in each, a plan which much facilitates reference. Full and useful bibliographies of some subjects are given. Altogether the second edition of *Deformities* is worthy of the reputation of its author and of British orthopaedic surgery.

[1] BRITISH MEDICAL JOURNAL, vol. i, 1897, p. 921.

[2] *Deformities, including Diseases of the Bones and Joints: A Textbook of Orthopaedic Surgery.* By A. H. Tubby, M.S.Lond., F.R.C.S. Eng., Surgeon to and in charge of the Orthopaedic Department, Westminster Hospital, etc., Surgeon to the Royal National Orthopaedic Hospital, etc. Second edition, in two volumes. London: Macmillan and Co., Limited. 1912. (Roy. 8vo, pp. 914 and 891; figures 604 and 483. 45s. net.)

SKIAGRAPHY OF THE NASAL SINUSES.

DESPITE the large number of books relating to diseases of the ear, nose, and throat, the literature of the subject in the English language is by no means rich in monographs dealing with *The Skiagraphy of the Accessory Nasal Sinuses*.[3] During the last four years Dr. LOGAN TURNER and Dr. W. G. PORTER have employed the *x* rays as a routine method of examination in cases of accessory sinus disease, and having obtained much useful information and practical assistance in their work from this method of examination, have placed on record their experience in a volume which undoubtedly should prove useful to others who are interested in the same branch of surgery. When noticing in these columns Dr. P. H. Gerber's monograph *Die Komplikationen der Stirnhöhlenentzündungen*[4] and Dr. A. Kuttner's atlas, *Die entzündlichen Nebenhöhlenerkrankungen der Nase im Röntgenbild*,[5] we emphasized the difficulties frequently met with in accurate diagnosis of the diseases of the accessory nasal sinuses by means of the ordinary clinical methods, and the uncertainty at times experienced in dealing with the sinuses surgically owing to an imperfect acquaintance with their actual size and their exact anatomical relations to one another. We further drew attention to the valuable assistance afforded by an examination with the *x* rays. It is a matter of common experience, as Dr. Logan Turner and Dr. Porter point out, that cases of frontal, ethmoidal, sphenoidal, and even of maxillary sinus suppuration are met with from time to time, in which the surgeon is not able to make up his mind regarding the condition of the sinus without first carrying out some small intranasal surgical procedure, such as the removal of the middle turbinated bone in order to catheterize the frontal sinus, to open the ethmoidal and sphenoidal cavities, or the puncturing and washing out of the antrum of Highmore for diagnostic purposes alone. By means of the *x* rays it is possible, in some cases at any rate, to arrive at a correct diagnosis when in doubt without such preliminary investigation and with advantage not only to the patient but also to the surgeon, who can thereby obtain information regarding the size and relation of the suspected cavity with which he may be called upon to deal.

The object of the volume is to demonstrate this fact, and to endeavour to simplify the interpretion of what must be regarded by many as a somewhat complicated skiagram of the head. The authors have achieved their object in a volume containing 45 pages of descriptive text and 40 plates of excellent skiagrams. In the selection of apparatus and technique they have followed Dr. Kuttner, and have employed the "Rotax" instrument supplied by the Sanatas Electrical Company of Berlin. The interpretation of the skiagrams is naturally a chapter in itself, and is followed by sections dealing with the development of the sinuses, the anatomical configuration and relations of the sinuses in the adult from a clinical standpoint, the skiagram in disease, and the skiagram in estimating the result of treatment. The authors arrive at the following, amongst other general conclusions, regarding the value of skiagraphy in accessory sinus disease.

Skiagraphy is a valuable aid in the study of the development of the air cavities, and is the only method by which it is possible to determine in the living, and without any operative interference, the existence of all the air sinuses. By means of the skiagrams it is possible to define the size of the frontal sinuses, the position of the inter-sinus septum, the presence of subsidiary partitions in the cavity, and a supraorbital extension of the sinus. To some extent, the relation of the sinus to the anterior ethmoidal cells can also be determined. It follows that from the anatomical knowledge thus derived the surgeon is in a better position to decide the operative treatment which

[3] *The Skiagraphy of the Accessory Nasal Sinuses.* By A. Logan Turner, M.D., F.R.C.S.E., F.R.S.E., and W. G. Porter, M.B., B.Sc., F.R.C.S.E. Edinburgh and London: W. Green and Sons. 1912. (Med. 4to, pp. 45, plates 40. 10s. 6d. net.)

[4] BRITISH MEDICAL JOURNAL, 1909, i, p. 23.

[5] Ibid., 1910, i, p. 575.

should be carried out upon a diseased frontal sinus, and, to a lesser extent, also upon the ethmoidal cells. Skiagraphy may also be of anatomical assistance prior to operations upon the maxillary and sphenoidal sinuses. The diagnostic value of skiagraphy is greatest in connexion with disease in the frontal and ethmoidal sinuses. In children, in whom it is commonly inexpedient or impossible to carry out intranasal diagnostic procedures, it will prove of undoubted advantage to obtain a skiagram of the sinuses. The skiagram may be usefully employed for ascertaining the size of dental cysts occupying the maxillary sinus, in determining the origin of choanal polypi, and for assisting us in defining the limitations of malignant growths in the sinuses, as well as for detecting foreign bodies. It is also of service in determining the effect of treatment upon the inflammatory affections of the accessory sinuses.

The authors draw attention to the limitations of skiagraphy as an aid to diagnosis of the exact nature of the pathological contents of a sinus or of the degree of inflammatory change which has taken place in its mucous membrane.

It would not be generous to take exception to the arrangement of a volume which, if not the first, is one of the first attempts to popularize in the English language a most valuable aid in elucidating some of the most obscure problems in surgery, but some would possibly have preferred the plates to have been inserted to face the text they illustrate instead of being placed together at the end of the volume. The plates are well printed and give a detailed representation of the sinuses as seen by radiography in the skull and in the living person both in health and disease.

INTRA-VITAM STAINING.

PROFESSOR EDWIN GOLDMANN[6] described the main results of his experiments with intra-vitam staining, in a paper read by him before the Royal Society and reported in the BRITISH MEDICAL JOURNAL of March 23rd, 1912, p. 670 (see also p. 745 of the following issue). He has now published a full account of his methods and results. He injected 0.5 per cent. to 1 per cent. watery solutions of pyrrhol-blue, isanamin-blue, etc., either subcutaneously or intravascularly into mice or rats under various conditions of health and disease, and studied their organs histologically at varying periods after injection. A dose of 1 c.cm. per 20 grams body weight was sufficient to cause the stain to be diffused in a few minutes throughout the whole body. The stain is taken up by specific cells which he now calls *histiogene Wanderzellen*, in preference to his former name of "pyrrhol-cells." He regards them as phagocytes and tissue-builders; they take up not only foreign bodies, but also leucocytes and erythrocytes, and various nutritive substances. They are usually round, but can change their form to suit their environment, and sometimes become spindle-shaped or oblong, often forming anastomoses with each other. They have a large nucleus rich in chromatin, and a firmly granulated protoplasm. The granules of the protoplasm take up the stain. The distribution of these cells in the different organs is interesting. In the stomach, for instance, they are very numerous in the pylorus, but towards the cardiac end much fewer. They are present in the peritoneal fluid, and increase considerably in number after irritation of or injury to the peritoneum. In the omentum they are found chiefly in the neighbourhood of the vessels. They congregate in numbers round a wound or a growing tumour. In the gravid uterus the serous coat contains a dense layer of these cells, especially in that part where the ecto-placental conus has already begun to develop. Here it could be distinctly observed that the cells gave off granules to the primitive *Anlage* of the embryo. Goldmann is convinced that the cells originating in the serosa, which penetrate the wall of the uterus, provide nourishment to the embryo in its very early stage by means of the vitally-stained cells. Later on, when the placenta is fully formed, other ways are opened up; at this stage the placenta acts as a protecting filter, and the fetus remains free from the stain injected into the mother. The vitally-stained cells in a tuberculous nodule become much paler some weeks after the infection has taken place. In proportion as the number of bacilli increase, the stain becomes more and more diffused in the protoplasm, till at last the granular structure disappears; this is held to be due to the deleterious effect on the cells of invasion by the bacilli. The nucleus, however, still takes the stain after the granules disappear. Goldmann thinks that the destruction of the granules deprives the cells of the power of amoeboid movement, and he observed that as their capacity for binding the vital stain decreased, their capacity for showing fat stains increased. He believes that the vital stains are bound by a fat albumen substance, and that, if this substance is broken up, the fat is expelled and the vital stain cannot be retained. He thinks this is the key to the difference in the behaviour of the fat stains towards intracellular and extracellular fat.

The work contains a good bibliography and beautiful coloured plates, which enhance its value.

[6] *Studien zur Biologie der bösartigen Neubildungen.* By Professor Dr. Edwin Goldmann. Nine engravings and 26 plates. (8vo. 1911. M. 8); also *Neue Untersuchungen über die acussere und innere Sekretion des gesunden und kranken Organismus im Lichte der vitalem Faerbung.* By Professor Dr. Goldmann. Three engravings and 30 plates. Tübingen: Laupp'schen Buchhandlung. 1912.

CLIMATE IN DISEASES OF CHILDREN.

DR. WACHENHEIM, of New York, is probably right in claiming that his book on the *Climatic Treatment of Children*[7] is the first on the subject, though the late Professor Simon, of Paris, wrote a work on spas for children some twenty years or more ago. Save in respect of tuberculosis, and to a lesser degree rheumatism, the question of climate in the treatment of children's diseases has not received sufficient attention, and has been mainly restricted to children known in ordinary phraseology as delicate. In a preliminary chapter on general principles Dr. Wachenheim deals at some length with the main essentials of climatology in relation to health and disease, and the possible advantages and the limitations of this means of treatment. When dealing with the subject of "sensible" temperatures it might have been well if he had included some instruction for roughly calculating these from a consideration of the ordinary thermometric reading along with the atmospheric humidity. There is a long chapter on the climatology of temperate North America, and a shorter one on health resorts, which contains brief description of the climates, giving the maximum and minimum temperatures, the altitude, the average rainfall, the prevalent winds, etc., of most of the known resorts, not only in America, but in England, the Continent, Egypt, and the West Indies. In addition, he treats of the advantages and drawbacks attaching to the sea voyages to be undertaken in reaching some of these places, and considers that the benefits of such voyages have been exaggerated. In a chapter on the climatic management of normal children, he deals not only with atmospheric conditions, but with such subjects as housing, warming, ventilation, clothing, bathing, etc. He justly condemns the so-called "hardening" methods by means of which imperfectly clad infants and children are exposed to all the vicissitudes of a changeable climate, with the result that they are caused a totally unnecessary amount of suffering, and are not unlikely to contract dangerous pulmonary and intestinal disorders. The remaining chapters are on the climatic aspects of constitutional diseases, visceral diseases, and scrofulosis and tuberculosis. As might be expected, the book is more likely to be of service to American practitioners than others, but there is much in it that cannot fail to interest readers on this side of the Atlantic.

NOTES ON BOOKS.

THE authoress of *Modern Methods in Nursing*[8] has had an unusually wide experience of her occupation, since she has been a matron both at Addenbrooke's Hospital and at two large American institutions. Her book covers a correspondingly wide field, and deals with considerable success with practically all the subjects which candidates for certificates in general nursing have to study. It is suitably illustrated, and has a very extensive index.

[7] *The Climatic Treatment of Children.* By Frederick L. Wachenheim, M.D., Chief of Clinic, Children's Department, Mount Sinai Hospital Dispensary, New York. London and New York: Rebman, Limited. 1911. (Demy 8vo, pp. 400. 6s. 6d.)

[8] *Modern Methods in Nursing.* By Georgina J. Sanders. Philadelphia and London: W. B. Saunders Company. 1912. (Demy 8vo, pp. 881, illustrations 228. 12s. net,).

The thirty-third volume of the *Transactions of the College of Physicians of Philadelphia*[9] contains, in addition to the ordinary contents of such volumes, an account of various papers read before the college during the year ending December 31st, 1911. Among the twenty-eight papers in the volume is one by Lawrence Flick reviewing a tuberculosis campaign which has been going on in Pennsylvania during the past ten years or so. His conclusion would seem to be that hope lies less in the curative treatment of individual cases than in the isolation of all advanced cases and the careful instruction of patients in an early stage as to how to avoid infecting their neighbours. The question of how far surgery can really be useful in chronic constipation is considered by Dr. J. G. Clark, who seems to be of opinion that there is plenty of room for surgery in this direction, but that it offers no field for the novice. Certain angeioneurotic phenomena in and around joints are described by S. S. Cohen as being frequently mistaken for gout and rheumatism; radium is dealt with by W. S. Newcomet, who appears to regard it as at any rate a very useful palliative in many cases of inoperable cancer, especially those connected with the uterus and the mouth.

We received early this month a copy of *The Medical Who's Who, 1912*.[10] The publishers inform us that they communicated with everybody without exception on the *Medical Register*, but that a large number of communications were returned marked "Gone away," "Not to be found," or "Dead." On a rough calculation the volume contains between three and four thousand names. The *Medical Register* for 1912 contains 40,913 names; allowing 6,000 for registered practitioners resident outside the United Kingdom—a liberal allowance—it is evident that this volume is not an adequate directory of the medical profession. It may be doubted whether the addition of a note on the recreations enjoyed by individual practitioners adds anything to the value of the entries; to many it will probably seem superfluous. The publishers state that since going to press a number of forms have been returned filled up, and that these will be dealt with in the 1913 edition. If it is to gain general confidence the book must, we apprehend, be entirely remodelled.

Though Mrs. Beeton still reigns as the authority on matters of cookery and household management, every year sees an increase in the numerous imitators who endeavour, with varying success, to follow in her footsteps. Miss WINIFRED STUART GIBBS, however, has struck out a new line in her most excellent little book on *Food for the Invalid and the Convalescent*.[11] She has had the advantage of five years' experience as adviser on diet to the New York Association for Improving the Condition of the Poor, and instead of confining her attention to the actual preparation of meals, she has bestowed no little care and attention on the equally important question of the prices and relative dietetic values of different foodstuffs, and the best and most economical means of keeping them fresh and untainted before consumption. A number of simple but attractive bills of fare are appended for the use of families, invalids, and children of varying ages. The recipes are so simple and so explicit that the proper preparation of a nourishing meal for persons of every age and condition should no longer present any terrors; and the book should prove as valuable to the busy housewife as to the social or dispensary worker for whom it is primarily intended.

In a scientific romance, *The Triuniverse*,[12] the author of *Space and Spirit* gives a graphic description of the startling events which are to befall the inhabitants of this planet in the middle of the present century. An inextricable confusion of the heavenly bodies is to culminate in an explosion of the sun; and the earth itself will only be saved through the superhuman exertions of a professor Karl, and his devoted disciple. The story, for the most part, is told in a series of dialogues in which the professor expounds to his friend at great length the whole doctrine of the triuniverse, that is, the threefold nature (form, life, and origin) of the universe. It is a clever book, though its cleverness is hardly of the kind that commends itself at first sight to the casual reader; but those who like their fiction to combine instruction with amusement should find food for thought in this strange romance of the future.

[9] *Transactions of the College of Physicians of Philadelphia*. Third series, vol. xxxiii. Philadelphia: Printed for the College. (Medium 8vo, pp. 508.)

[10] *The Medical Who's Who, 1912*. London: London and Counties Press Association, Limited. 1912. (Crown 8vo, pp. 310. Price 10s. 6d.)

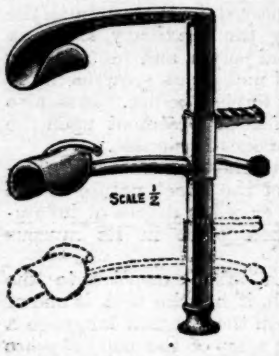
[11] *Food for the Invalid and the Convalescent*. By Winifred Stuart Gibbs. New York: Macmillan Company. 1912. (Cr. 8vo, pp. 91. 3s. 6d. net.)

[12] *The Triuniverse*. A Scientific Romance, by the author of *Space and Spirit*. London: Charles Knight and Co., Ltd. 1912. (Cr. 8vo, pp. 221. 5s. net).

MEDICAL AND SURGICAL APPLIANCES.

A Mouth Gag.

MESSRS. ALLEN AND HANBURYS (Wigmore Street, W.) have made for Dr. Hugh R. Phillips (Anaesthetist, Italian Hospital, and West End Hospital for Nervous Diseases) a gag, a modification of a continental pattern, which is illustrated in the accompanying diagram. Dr. Phillips finds it specially useful in cases about the mouth or throat where it is necessary to keep up the administration of the anaesthetic. It is advisable to open the mouth with an ordinary gag to the extent required, and then place this one in position. It takes up little room, and is not in the way of the operator, as it fits closely to the cheek; by the tube attachment can be made to a Junker apparatus.



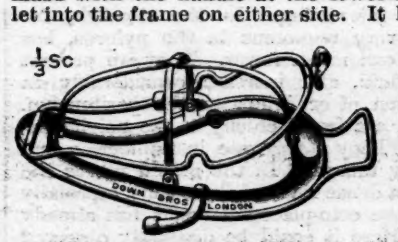
Laryngeal Mucous Catheter.

Dr. E. MARSHALL COWELL (Croydon) writes: Probably the commonest cause of failure in the treatment of asphyxia neonatorum is the omission to clear the upper air-way before performing artificial respiration. The amount of mucus aspirated during the premature respirations which occur in fetal distress is often surprising. A metal catheter having a slightly bulbous end has been in use for years at Queen Charlotte's Lying-in Hospital.

Since I have failed to find such an instrument in any catalogue, Messrs. Allen and Hanburys, Ltd., have made for me the modification shown in the illustration. The advantage of the trap here introduced is that there is no fear of mucus reaching the operator's mouth, and also that adequate aspiration followed by insufflation of the lungs can be performed with a single passage of the catheter.

Schimmelbusch Mask with Oxygen Tubes.

Dr. FRANCIS E. SHIPWAY (London) writes: It is very often necessary or desirable during the administration of ether or chloroform to give a continuous supply of oxygen, and the appended sketch shows a modified Schimmelbusch mask which fulfils this requirement more completely and with more convenience than any with which I am acquainted. It consists essentially of a folding guttered mask with the handle at the lower end and a small tube let into the frame on either side. It has been in constant use for twelve months, and has proved especially serviceable in operations about the face and neck. It has the following advantages: (1) It is light, folds up, and is easily portable. (2) The oxygen is delivered opposite the mouth. (3) The tubes for the administration of oxygen or chloroform from a Junker's apparatus are small and out of the way of the operator. (4) The handle is of help in holding the mask and in keeping the chin forward. (5) The anaesthetist has the choice of two tubes to which to attach the tubing from an oxygen cylinder, so that on whichever side the head rests the tubing is not in the way. (6) If chloroform is being administered a Junker's apparatus can be attached to the tube and an oxygen cylinder to the other. (7) It is well adapted for ophthalmic operations. The mask has been made for me by Messrs. Down Brothers, Ltd., St. Thomas's Street, London, who have taken much care in carrying out my instructions.



THE HISTORY OF MEDICINE.

[First Notice.]

Professor Neuburger is one of the recognized authorities on the history of medicine, and his work, of which the first volume, translated by Dr. Ernest Playfair, is before us, is already a classic on the subject.* Sir William Osler, who contributes a preface to the English edition, calls attention to the fact that within the past twenty years there has been a remarkable revival of interest in the history of medicine. Chairs or lectureships have been established in Continental and American universities, and societies devoted to the subject have been started. There are three or four journals devoted to medical history, and the literature has been enriched by innumerable monographs and articles. In this country the study is, perhaps, less cultivated, yet the history of the evolution of medical knowledge is of fascinating interest and contains many a lesson that might be profitable to the most modern of practitioners.

Neuburger's first volume records the growth of medical art to the Renascence. The translation of the second volume, dealing with the modern developments of medicine, is to be issued shortly.

The book has been planned and constructed in all its details with true German thoroughness; it tells all that can be known about the medicine of antiquity and the Middle Ages. The first section, on primitive medicine, is of especial interest. The art of healing is traced back to its very beginning in the instinct of animals.

Heated animals refresh themselves in cold water, warm their stiffened limbs in the sun and destroy irritating parasites. Cats and dogs lick their wounds; dogs eat grass to excite vomiting. A dog with a broken bone runs on three legs, holding the broken one so that it may set without appreciable shortening. Monkeys seek to check the flow of blood by application of the paw, and are adept in the extraction of foreign bodies such as thorns. The medicine of animals, moreover, is not confined to self-help, but extends at times to the help of others, particularly in dealing with the young.

From the primitive actions of scratching, rubbing, or pressure, moistening of wounds with saliva by sucking them, and other purposeful reflex and instinctive actions, highly differentiated methods of treatment have been evolved—as, for instance, massage. Among the earliest practices in the healing art are naturally the manipulations used to aid in childbirth and the attention given to young children. Surgery dates from the use of instruments in extracting foreign bodies, the opening of abscesses, scarification, and blood-letting. Experience showed that some wounds were mortal, while recovery from others might be expected to take place naturally, or might be promoted by simple measures. Certain members of a tribe would display special dexterity and acquire a reputation as healers, and the author assumes that by the transmission of their experience to successors a class of practitioners would come into existence. He refers to the fact that trephined skulls from the Neolithic period have been found in most European countries, in Algiers, the Canaries, North America, Mexico, Peru, and the Argentine. Cicatrized trephine holes in many of these skulls prove that the operation had sometimes been performed two or three times on the same person. Other traces of prehistoric surgery are found in circumcision, which must have been performed with a sharp-edged flint. The remaining bones of Neolithic man show in many cases distinct traces of disease and injury.

Thus fractures of various bones (some healed almost without deformity), injuries (from flint arrowheads), ankylosis, inflammatory processes, caries, necrosis, and rickets have been described.

In graves belonging to the Bronze Age the remains show the marks of injury and arthritis deformans. Diseases of which the cause was not visible were attributed to magic or the operation of evil spirits, and from this general concept there arose the notion that there were specific spirits which caused different diseases. Sometimes it was thought that the disease was caused by possession, that is, by the occupation of the sick man's body by spirits of dead men or of demoniacal animals. With all this superstition it is not a little remarkable, as is pointed out by the author, that amongst many races of very low civilization, natural causes of disease are admitted, such as unhealthy winds, unsuitable food, over-exertion of body, heredity in the case of leprosy and epilepsy, and, most striking of all, "infection" in tuberculosis of the lungs. The demoniacal and magical etiology of disease gave rise to modes of treatment directed to combating evil spirits by spells, angry deities by propitiatory rites and sacrifice, and maleficent magic by counter magic. Hence the witch doctors were looked upon not only as healers of disease but as prophets having power to influence the elements, to ensure success in battle, and to foretell the future. In their treatment the obscure influence which we call "suggestion" naturally held the chief part. This was put in operation by amulets, such as pieces of bone trephined from the skull after death, the teeth of animals, the vertebrae of snakes, and so forth. The magical procedure employed by the prehistoric healers seems to have consisted in religious observances, such as sacrifice, prayer, fumigation, purification, and fasting, as well as in spells and exorcisms directed to the casting out of demons and the transference of disease. With these were joined rational measures, like massage and blood-letting, baths and diet; these, again, were transformed into ritual observances. The amulet is the oldest prophylactic, and seems to express the belief that the portions of another body endow the possessor with their functions, and in that way reinforce their natural healing powers. From the original devouring of organs, such as the testicles, the brain, the marrow, and so forth, was derived the simpler custom of merely wearing on the body portions of animals immune against poison or rare, polished or odoriferous objects.

Mesopotamia seems to have been the nursery, if not actually the cradle, of all culture. From the scanty fragments of Babylonio-Assyrian medicine which have come down to us it may be gathered that it had a theurgico-empirical character. Prayers, spells, and amulets were largely used, but therapeutic measures were also employed. Polypharmacy was in great vogue, and something akin to patent medicines with fancy names, such as medicine of the Sun God, dog's tongue, and skin of the yellow snake, were used. Among external applications may be mentioned inunction, friction with oil, enemas, baths, affusion with cold water, and cupping. Blood-letting was also employed. It is probable that astrology was used in prognosis, and that different anatomical regions were placed under the dominion of the signs of the zodiac. Vast records of omens were collected by the priests. In these animals played a large part, such as the sudden appearance of one in a house, meetings with dogs or calves, the flight of birds, and so forth. Remains of these superstitious beliefs may still be found at the present day. The collection of omens, which constituted a considerable portion of the library of Sardanapalus, grandson of Sennacherib, King of Assyria (668–626 B.C.), led to a collection of observations on disease. Thus in time there grew up a kind of official clinical record which, used at first for the purpose of prophecy, was employed later as a means of prognosis. The Mesopotamian doctors were a part of the priesthood, but it is probable that there were also independent exorcisers, cuppers, and layers on of plasters, who were subordinate to the physician. In exactly the same way surgeons and barbers were subordinate to the monks who practised medicine in the Middle Ages. Hence it is not, perhaps, rash to conjecture that in this way arose the subordination of the surgeon to the physician, which continued into modern times.

Egypt, which in antiquity was thought to be the birthplace of all wisdom, had a great reputation for medicine. It was considered as the healthiest of all countries, and, like a modern health resort, it swarmed with doctors. Medical practice was highly specialized. Egyptian doctors anticipated one of the most "modern" fads—that disease is to be cured chiefly by fasting. Neuburger places the era of the highest development of Egyptian medicine about 2000 B.C. In the Egyptian view the art of healing was supernatural in origin, and a number of gods stood in close relationship to medicine. Thoth or Hermes, symbolized by dog apes and dog-headed men, and the ibis were the special gods of medicine. The physician belonged to the priesthood—that is to say, to the class which had a

* *History of Medicine.* By Dr. Max Neuburger, Professor of Medical History in the Imperial University of Vienna. Translated by Ernest Playfair, M.B., M.R.C.P. In two volumes. Vol. I. London: Henry Frowde, Oxford University Press; Hodder and Stoughton, Warwick Square, E.C. 1910. (Imp. 8vo, pp. 414, 25s.)

monopoly of learning. Medicine was taught in the schools connected with the temples, among the most celebrated being those of Memphis and Thebes. The pupils received practical as well as theoretical instruction, opportunity being afforded by the number of patients who sought care in the temples, while the physician priests also visited the sick in their own houses. The system had the advantage that regular education was assured, and it may perhaps be inferred that quackery was resented. On the other hand, science being confined to the priestly order, was held fast in the trammels of theology. It is significant of the decline of Egyptian medicine that, whereas in the oldest documents pharmaceutical remedies prevail, though forms of prayer are given, in those of later date magical formulae and incantations predominate. Magical sentences accompanied the preparation of drugs, or were spoken by the patient while taking them, just as we have seen a good Catholic make the sign of the cross over a dose of physic.

The Egyptians had a large and varied pharmacopoeia derived from the vegetable, animal, and mineral kingdoms. The forms in which medicines were given or applied were draughts, electuaries, masticatories and gargles, snuffs, inhalations, salves, plasters, poultices, injections, suppositories, enemas, and fumigations. Of the surgery of the Egyptians little is known, but there is proof that they operated on tumours, and they had a high reputation for ophthalmic surgery. In mummies well united fractures have been found, as well as fractures showing overlapping of the fragments to a considerable extent. Even in the present day the *x* ray shows that this kind of thing occurs to an extent which a few years ago was unsuspected. The lancet and cautery were in use for operations. Hygiene and prophylaxis ranked high among the Egyptians, who paid great attention to the care of their children. Neuburger says that they also knew a good deal about dentistry, crowning, and gold stopping, but recent researches do not seem to bear out this statement.

In ancient Persia, disease was regarded as the work of Ahriman the devil, and the treatment was directed to the ejectment of the evil spirit from the body. Treatment by the knife was not unknown, and in the regulations concerning permission to practise the healing art great stress was laid upon operative dexterity; only one who had successfully performed three operations upon unbelievers was allowed to exercise his craft upon those of the true faith. It was the law that if a man first operated on a heretic and the patient died, he was allowed to operate a second time also on an unbeliever, and if death followed he had a third chance. If that, too, proved fatal, he was unfit for practice for ever. If any one who had failed in this test dared to practise, and lost a patient as the result of unskilful treatment, his offence was looked upon as a premeditated murder. We have no right to regard this regulation of medical practice as too Draconian, since it is not so long ago since one of the pioneers of ovariotomy in this country, having lost his first three patients in succession, was threatened by a colleague with an inquest if another fatality occurred. The doctrine of Zoroaster was a cult of spiritual and bodily cleanliness. Much, however, that we commend as hygienic in these old Oriental codes of health was so but secondarily, and sprang primarily from religious motives. When, for instance, we find purification, washing, and isolation of the sick practised, we must remember that this is rather evidence of a belief in demons than a foreshadowing of antiseptics. A stern consequence of the belief of "uncleanness" in disease was the isolation of the incurable.

The descriptions of disease in the Bible are fragmentary, and it is difficult to identify the morbid conditions to which reference is made. The cure of disease was looked for through prayer and sacrifice; but diet and drugs, baths, salves, and fumigations were also employed. Of surgical measures circumcision is the only one mentioned. Oil, wine, and balsam were used in dressing wounds, and bandages were applied to broken limbs. Physicians are several times mentioned, and were held in high esteem.

Three epochs are to be distinguished in Indian medicine: 1. The Vedic, extending from the first migration of the Hindus into the Punjab to about 800 B.C. 2. The Brahministic, in which the priestly caste was dominant, representing the Indian Middle Ages. 3. The Arabic, commencing about 1000 A.D. From the Vedas it is seen that the most ancient Indian medicine has its foundation in theurgy. There are traces of empirical knowledge of disease, the action of herbs, the use of cold water, and some primitive surgery. In later Vedic times the physicians formed an independent class, and to a certain extent were in opposition to the Brahmins. The Vedas were familiar with the extraction of arrows, the dressing of wounds, artificial limbs, and castration, and they recognized a number of diseases, among them scrofula, vertigo, dropsy, epilepsy, gout, heart disease, jaundice, and hemiplegia. They used means to produce abortion, and to favour conception, and made a large use of aphrodisiacs, a characteristic of Indian medicine even at the present day.

Neuburger epitomizes Chinese medicine in the statement that its central doctrine is that the human body with its powers is, down to the minutest details, a reflection of the phenomena of Nature in the universe. Dissection being forbidden, the Chinese notion as to the structure of the human frame is mostly fanciful. The Emperor Kang-Hi (1662–1723) caused a translation of the anatomy of Pierre Dionis to be made by the Jesuit Perennin, but this attempt to introduce Western anatomy was defeated by the native doctors. The most minute attention is given to the pulse, which is considered a sufficient indication for the diagnosis of the nature and site of the disease. Chinese medicine is rich in the department of therapeutics. The belief that in Nature there exists a remedy for every ill has led to the trial of every imaginable substance, of vegetable and animal, and, to a less extent, mineral origin. To the Chinese Western medicine owes the use of rhubarb. Mercury has been used in syphilis for centuries. Animal extracts are used—liver, lungs, and kidneys of different animals being given for diseases of these organs, the semen of young men or nerve tissues of animals for conditions of weakness, the testicles of animals for impotence, and placenta to assist childbirth. Prophylactic inoculation for small-pox has been practised in China at least since the eleventh century. A special feature of Chinese treatment is acupuncture, which is used in painful and inflammatory conditions. The idea is that the body is permeated by a system of tubes, and that this procedure allows harmful materials to escape. Owing to ignorance of anatomy surgery is quite primitive, but massage is much practised. The Chinese produced general anaesthesia by narcotic extracts in ancient times. It is even said that a physician named Hoatho in the third century performed amputation, trephining, and other major operations under anaesthetics. Before the introduction of European culture into Japan, China was to that country the source of science and religion indirectly by way of Corea.

Among the Aztecs the art of medicine was mainly empirical, but it is noteworthy that the ancient Mexicans had hospitals, particularly for wounded soldiers, and institutions for the incurable. They also had botanic gardens, with large numbers of medicinal plants. The Spanish Conquistadores were struck by the surgical skill of the Mexicans. In spite of many analogies with the East, no connexion between Oriental and Mexican medicine has been traced. Among the other American civilizations medicine was less developed. Among the Peruvians in particular it was mystic, and exercised by priest physicians.

THE HENRY PHIPPS TUBERCULOSIS INSTITUTE, PHILADELPHIA.

THE sixth annual report of the Henry Phipps Institute for the study, treatment, and prevention of tuberculosis has been issued. It really embraces two years' work—from February, 1908, to February, 1910. Early in 1910 the institute, which was founded and is maintained by Mr. Henry Phipps, was placed under the control of the University of Pennsylvania. Dr. Lawrence Flick, who had organized and directed its destinies from the beginning, having resigned, the institute was reorganized to some extent in order to meet the requirements incident to its use as a teaching institution, while still retaining its character as a research agency.

One of the purposes of the Phipps Institute is to gather clinical and sociological data relating to tuberculosis. The clinical part of the report deals with a great variety of

conditions which have been observed in tuberculous patients. The three races showing the highest proportion of patients attending the institutes are the Celtic (27.7 per cent.), the Jewish (20.3 per cent.), and the Teuton (19.8 per cent.). From the records of 3,551 patients, it appears that the average number of persons in each of these patients' houses was 5.82; the average number of sleeping rooms was 3.24, and of beds 3.97. A source of contagion could be found in over 60 per cent. of nearly 5,000 cases. Out of 5,895 cases treated, 3,475 were males and 2,420 females. Regarding the parts of the lungs in which tuberculosis began, an interesting table is given, showing that out of 5,895 cases 3,691 began in the right apex, 1,073 in the left; in 1,076 cases the lung first attacked could not be determined; in 28 cases the examination was incomplete, and 27 cases were not tuberculosis of the lungs. Sputum containing tubercle bacilli occurred in 2,187 and was absent in 1,253 out of the number examined (3,440). The frequency of gastric disturbances in tuberculosis is well shown, nearly one-half of 4,436 patients giving a previous history of gastric disturbance. The results of treatment, so far as the arrest of the disease, improvement, etc., are concerned, are given, and also the results in weight, making a very creditable showing, especially when the advanced stage of the disease and the poor living conditions of most of the patients are considered. A table is given of the comparative results in patients who gave a history of alcoholism and those who denied such a history. The results seem to be much better in the case of the abstainers. The great majority of the patients applying for treatment had passed the incipient stage of the disease.

There is a pathological report on the cases on which necropsies were performed. In a paper on the relation of intestinal absorption to pulmonary anthracosis, Dr. C. M. Montgomery relates experiments carried out on guinea-pigs. Villaret, in 1862, claimed that he had produced anthracosis of the lungs in animals through the intestinal route, finding the lungs anthracotic in rabbits that had received carbon mixed in food over a period of six hours. Calmette believed that he had demonstrated that most cases of pulmonary tuberculosis are the result of the penetration of the bacilli through the intestinal walls. As a result of his experiments, Dr. Montgomery says that the alimentary route has failed to lead to pulmonary anthracosis in guinea-pigs. Intestinal absorption of inert particles has been demonstrated by proper experiments, but only after the repeated ingestion of amounts far in excess of those entering the alimentary tract under normal conditions. Particles absorbed from the intestinal tract have been found in the intestines and mesenteric glands, but in no other organs.

Dr. J. Douglas Blackwood contributes an article on the ophthalmo-tuberculin reaction, and as the result of his investigations on a considerable number of cases, has arrived at the following conclusions:

1. No injurious results have been observed in any of the eyes tested by this method.
2. Cases in which the previous lesion was healed have a negative reaction.
3. There may be a recurrence of the reaction upon the lighting up of pleurisy.
4. The severity of the reaction has no relation to the extent of the pulmonary involvement.
5. The reaction is of service, on account of its simplicity in demonstrating the presence of a tuberculous lesion which cannot be demonstrated clinically.
6. Negative reactions occur in rapidly progressing cases.
7. The degree of the reaction has not proved, in these cases, to be of any great value as a prognostic index.

The concluding paper in the report is one by Dr. E. Burville Holmes on the finding of alleged tubercle bacilli in the blood. After referring to the studies of Rosenberger—who read a paper before the Pathological Society of Philadelphia in 1909—and to the articles of Forsyth and of Hewat and Sutherland in the BRITISH MEDICAL JOURNAL in 1909, Dr. Holmes states that his observations on fifty cases of tuberculosis which form the basis of his paper were uniformly negative, with one exception. The one patient in whose blood acid-fast organisms were found presented no physical signs whatever. Her history, slight cough extending over a period of a few months, with loss of weight and feeling of fatigue, however, were regarded as suspicious. She did not respond to the tuberculin test. In a blood smear two separate groups, one of five and one of three acid-fast organisms, were found. They were by no means typical of the tubercle bacillus. Dr. Holmes thinks it clear that the tubercle bacilli do not constantly circulate in the blood of tuberculous patients, though they are occasionally present, as shown by the inoculation experiments of Lieberminster.

The report, with its statistical material, along with the papers alluded to, is a valuable contribution to the study of tuberculosis, and in a well-equipped institute such as this, with such a large number of cases coming up for treatment, the collection of such data cannot fail to be very helpful to other investigators.

LITERARY NOTES

WE have received a copy of a pamphlet entitled *The Shakespeare Myth*, which is described in a covering letter as "from the eminent pen" of Sir Edwin Durning Lawrence. The wielder of the eminent pen in question is in the matter of Bacon a "whole hogger." It is even asserted that besides Shakespeare's plays, the English authorized version of the Bible flowed "from the pen, or at least from the editorship" of Bacon. Of the curious learning with which this sweeping thesis is supported a single example may suffice. "Honorificabilitudine," which occurs, in the plural, in *Love's Labour's Lost*, is said to "give us the Masonic number 287, and really tells us with the most absolute mechanical certainty that the plays were Francis Bacon's orphan children." Such virtue is there in one long word! Clearly the pages of this journal cannot be opened to the discussion of the "Bacon is Shakespeare" hypothesis, but as Sir E. Durning Lawrence, who has presented to every public library a copy of a book with this title which he wrote a few years ago, has now made a still more broadcast distribution of his pamphlet, it seems proper to say that Dr. R. W. Leftwich has written a brief refutation, *Bacon is not Shakespeare* (London: Simpkin, Marshall. 6d.). It is very effectively done, but we must content ourselves with extracting the information that the long word transcribed above was used by Dante.

In view of the horror with which dissection was regarded by most people in the sixteenth century—as it still is by not a few at the present day—the following passage from the life of Saint Francis de Sales, by M. Human, which is quoted in the *Chronique Médicale* of April 15th, 1912, may be interesting. Francis of Sales, who was born on August 21st, 1567, had been sent by his father, the Lord de Boisy, to Padua in 1587 to study law. There he was seized with dyspeptic disturbances, accompanied by insomnia, anorexia, and extreme emaciation. Finally, says the author, this state of languor became complicated by a violent and continuous fever, accompanied by dysentery and general rheumatism. He was given over by the doctors, and warned of the imminent danger in which he was by his tutor, who asked his intentions in regard to his funeral. "My dear master," he answered, "I leave the care of all that to your affection, which is well known to me. I have only one favour to ask—that is, that my body should be given for dissection to the medical students." "What! my dear son," said the tutor, "that would be a dishonour to your family." "Pardon me, my dear master," replied the sick man, "if I do not agree with you. It will be a great consolation to me in dying to think if I have been during my life an unprofitable servant, I shall at least be of some use after my death by supplying to the students of medicine a subject on which they can work without having bought it at the cost of fighting and murder." The students of Padua in those days had many fierce and bloody fights in their efforts to procure bodies for dissection. Earlier in the century the immortal Vesalius did not disdain to play the part of resurrection man.

Père Renard, S.J., has lately published a book, entitled *Arthropodes Pathogènes et Transmission de Maladies*, which is intended to be a popular treatise on the part played by insects in the conveyance of disease. The work is published by M. Charles Bulens, 75, rue Terre-Neuve, Brussels.

British Medical Journal.

SATURDAY, AUGUST 24TH, 1912.

THE EXPERIMENTAL CHEMOTHERAPY OF CANCER.

The failure by the methods of immunity to influence growing transplanted tumours or to prevent spontaneous neoplasms in animals, and, on the other hand, the brilliant results that attended Ehrlich's endeavours to elaborate chemical compounds which, when introduced into the body, selected and killed parasites without exerting a lethal effect on the organs, naturally incited investigators to an attempt to construct compounds which might be selective of and noxious to tumour cells, and yet at the same time have a minimum toxicity to normal tissues. The problem is exceedingly difficult, and if it is to be solved on these lines at all we must possess infinitely more knowledge of the excessively minute chemical differences between a normal and a malignant cell. Such differences as are known to exist at present are quite inconstant. The greater avidity for oxygen and foodstuffs, on which Ehrlich has laid such stress, though perhaps admissible in the case of rapidly growing experimental tumours, does not apply with any great force to the more slowly growing cancers in human beings. On that theory of greater avidity the recent investigations of v. Wassermann[1] and his colleagues were built. After numerous attempts, these observers chose a compound composed of selenium and eosin, which, when introduced into the caudal vein of tumour-mice by repeated injections, produced a liquefaction of the tumour substance with subsequent absorption of the fluid products. The details of preparation of this substance and its exact composition were withheld at the time, probably because of the fact that, owing to its extreme instability, the investigators were unable always by the same technique to produce the same active drug. The numbers of animals used, in view of the lethal effects produced by the drug itself and the occurrence of spontaneous healing, probably did not warrant the conclusion that the chemical compound was selective of the tumour cells; and it is possible that the favourable effects produced on the tumour are explicable by interference with its vascular supply owing to chemical thrombosis or some such phenomenon. Still, giving due weight to objections of that kind, it must be admitted that the results are sufficiently striking to open up a new field in the chemotherapy of tumours.

At the time when v. Wassermann made his communication many others were engaged on the same task, including some who were experimenting with selenium and tellurium, the two substances that v. Wassermann employed. The work of one of these investigators, Neuberg, in collaboration with Caspari and Löhe, has just been published.[2] The characteristics of malignant tumours that have impressed these observers most are the rapid growth and the still more rapid disintegration of cells. However true the latter may be in respect of inoculated tumours of mice and rats, on which their work has chiefly been done, or even in respect of spontaneous tumours in these small animals, yet it is by no means an outstanding feature in the malignant tumours in higher animals, and researches in the chemotherapy of cancer can be only of academic interest if they do not put a true value on this autolysis of neoplasms. The autolysis occurring in tumours is considered by Neuberg to be an evidence of abnormal ferment activity, and for proof of the presence of these abnormal cell enzymes he depends largely on the investigations of others, whose conclusions are to be accepted with considerable caution. Neuberg, from previous work of his own, came to the conclusion that the action of radium in cancer was not a direct one on the tumour substances, but indirect on their enzymes, and his present researches began with an attempt to find metallic substances capable of producing in this manner an increased autolysis in tumours. The salts of heavy metals are typical precipitants of proteins, and their introduction into the body was at first without useful result because this characteristic had been called into play long before they reached the tumour substance. The difficult part of the problem was accordingly to give these presumably autolysing substances such a form that, when they were introduced into the body, they would be arrested and broken down only in the neoplasm. Furthermore, these desirable tumour-selective substances must have the least possible toxicity for the rest of the organism. Colloidal salts of the metals might prove more useful than organic compounds, but it is not clear from the communication whether the preparations introduced were colloidal in form or only became so after introduction into the body. After laborious trials of various organic compounds of the metals, these investigators claim to have elaborated tumour-selective substances from bases of copper, cobalt, silver, gold, platinum, iridium, ruthenium, osmium, palladium, and rhodium, but it is to be regretted that no details are given of the exact constitution or mode of preparation of any of their active constituents.

The experiments were conducted on mouse carcinoma, at first exclusively, but after considerable improvement of the active substances a broader application was made. At first the preparations were injected subcutaneously, with the result that frequently a doubtful retrogression of the tumours with occasional flaccidity was produced. The malignant process was, however, retarded, and the animals lived longer than usual, though energetic growth of the tumour later was the rule. When, however, v. Wassermann's paper appeared advocating injections of tumour-selective substances into the blood stream, they at once adopted this technique, and found that their preparations, which previously had given only moderate results, became exceedingly active when introduced directly into the circulation. All the compounds they employed did not act equally favourably and speedily, but none of them was altogether inactive. Compounds from copper, tin, platinum, and especially cobalt and silver, were found to give the best results. The results of injection rapidly made themselves evident, and deposits of the metals in an amorphous form could afterwards be demonstrated in the broken-down tumours. Several injections had to be given to produce complete cure of the tumours. That such cures were not to be attributed to spontaneous absorption, which is of great frequency in some strains, was established by rigorous controls

[1] Beiträge zum Problem: Geschwülste von der Blutbahn aus therapeutisch zu beeinflussen, *Deut. med. Woch.*, December 21st, 1911. See also British Medical Journal, January, 1912, p. 39.

[2] Weiteres über Heilversuche an Geschwulstkranken Tieren mittels tumoraffiner Substanzen, *Berl. klin. Woch.*, July 22nd, 1912.

with untreated tumour-bearing mice. In their control experiments they found that spontaneous absorption was extremely rare in their various strains, and they submit that even if it did operate in some of the cases injected with their substances, yet the outstanding phenomenon was the rapid effect following the administration of the drugs. A table is given showing the quantity of metal in the preparations per gram of body weight; this quantity varies from 0.075 mg. of platinum to 1 mg. of cobalt for a mouse weighing 15 grams.

Caspari described the effects of the substances. When they were injected into the caudal vein of tumour mice, an extreme pallor of the visible vascular parts—the ears, nose, and paws—was instantly produced, and if such a mouse was killed at the time, it would be seen that the vessels in the tumour were extraordinarily dilated and full of blood. The capillaries had apparently lost their tone and blood extravasations, microscopic and macroscopic, could be found in the tumour. In extreme cases it would seem as if the mouse had bled into its own tumour. The other part of the body was in marked contrast, and the vessels there were small and contracted. The first effect after injection was a strictly localized bleeding in or about the tumour, and the intensity of the effect produced was the greater the more numerous the blood vessels in the vicinity of the tumour. It was found that the lethal dose of substances was greater in the case of tumour mice than in healthy mice on which the toxicity was determined, and the neoplasm would thus seem to act as a magnet in withdrawing the active principles from the general circulation. Softening after injection of the substances occurred without exception in every malignant tumour. Frequently, only two hours were sufficient to make the effect clear, but it was always evident during the first twenty-four hours. At the end of that time the largest part of the tumour was completely softened—it had become a flaccid sac. There were still to be felt in the interior, apparently floating in the fluid part, more or less hard nodules, which slipped away from the palpating finger. The wall of the sac felt firm, and frequently little swellings could be detected on its inner side. So long as this condition was present, complete healing could not be obtained; in fact, such hardness was a certain sign that if treatment was suspended the growth would advance. If the injections were repeated, the nodules gradually vanished, the wall of the sac softened, and eventually became a delicate transparent membrane, which could not be kept intact on dissection. When this stage was reached, perhaps after many injections, the animal could be regarded as cured, and microscopic examination showed necrosis of the tumour remains without a trace of any intact cancer cells amongst the débris. The membrane contracted to a cordlike structure, which remained for weeks, and even months, before it entirely disappeared.

Such a favourable result did not always follow. Many of the animals, before the preparation of the substances was improved, died from the effects of the injection. All the preparations were poisonous, and they found, as did Wassermann with his eosin-selenium compound, that the effective and the lethal doses were uncomfortably near each other. The results became the more unsatisfactory the further they got from the lethal dose, and as a matter of fact they found that too low a dose, so far from destroying the tumour, actually stimulated it to quicker growth. Again, a large percentage of the animals died from the absorption of the degeneration products of the tumours. Treatment had all the while to be forced, because a pause for a single day allowed extension of the growth. Sometimes, too, owing to the rupture of the sac, the escaped fluid contents became septic through involvement of the skin, and the animal died from suppurative processes. Further, even after considerable practice, only a relatively small number of injections could be made into the caudal vein of the mouse. Thus twelve injections would generally be inadequate if the mass of the tumour were a quarter of the body weight. Treatment had often to be broken off on this account; injections into the femoral vein were tried, but though the technical difficulties were not great, the animals did not stand this procedure well. In such cases subcutaneous injections of sodium iodide were found to retard the growth for three or four months, and even occasionally to produce entire destruction of the neoplasm.

The investigations were extended to rat sarcoma, which was found to be quite as easily influenced as mouse carcinoma. The technique of intravenous injection was, however, more difficult in the rat. As the toxicity of the substances was greater for the rat than for the mouse, only one-half the dose of metal per gram of body weight on the mouse scale could be employed. On the other hand, the dangers arising from absorption of liquefied tumour products were minimized, because 2 or 3 c.cm. of the fluid could be removed daily by means of a sterile cannula. Further, an interruption of the treatment did not allow a recrudescence of the growth, as in the case of mouse carcinoma, for the effect of an injection lasted for several days. Considerable extravasations of blood into the tumours took place, and after one or two injections tumours the size of an orange were more or less liquefied.

The chief interest lies in the results of the treatment of spontaneous tumours. Four such tumours in mice were investigated. In one of these, which died after the first injection, there was considerable effusion of blood into the tumour, with a liquefaction of its central portion. In another there was marked softening of a large mammary tumour two hours after injection. In a third a large prominent mammary tumour became bluish-red in colour after the first injection, an indication that haemorrhage had taken place into it, and soon afterwards the skin became tense and fluctuation was evident. The animal died of asphyxia from compression of the trachea after a week of treatment, and though the tumour had not by that time completely disappeared, sections showed that the greater portion was fluid, whilst the rest was a necrotic, blood-stained mass. A fourth spontaneous tumour reacted scarcely at all, and remained extremely hard. On histological examination it proved to be a cellular fibroma benign in character. This is worth noticing, because benign tumours do not usually exhibit the tendency to break down; and, as the observers add, "it is only in tumours in which autolysis is natural that we can expect results from these preparations."

They had the further opportunity of testing the action of these substances on a poodle dog, which had a large number of mammary tumours, varying in size from a hazel nut to an orange, which were found to be cystic adeno-carcinomata. The dog was found to be more sensitive than the rat to the toxic effect of the drug. It received on two successive days one-half of the lethal dose on the mouse scale. Unfortunately it had contracted distemper, to which it succumbed in six days, but it is probable that the end was hastened by the rapid destruction of the tumours, which far exceeded expectations. The destruction of tumour progressed till the death of the

animal, and at the autopsy 70 c.cm. of thick brownish fluid was removed from the tumour area. It cannot be said that the results of treatment in the case of spontaneous tumours were perfect, but they are evidence of the activity of the substances which further experience may enhance.

MENTAL DEFICIENTS AND THE COMMUNITY.

THE Mental Deficiency Bill of the Government has for the most part met with the approval of those who are interested in the social welfare of the people, because in its main outline it seemed to provide for the better care and protection of the feeble-minded themselves while seeking to diminish the evil by cutting off one important source from which such persons are derived. It appears, however, that there is an exception to this attitude. At the recent meeting of the Roman Catholic Congress at Norwich the following resolution was unanimously passed:

> That, while recognizing the grave evils that arise from the unprotected condition of the feeble-minded, and desiring to see them dealt with by legislation in such manner as amply to satisfy the religious needs of the patients, this Congress of Catholics protests against the Mental Deficiency Bill now before Parliament as contrary to Christian morals and elementary human rights, and calls for its immediate withdrawal for reconsideration.

To be told that a bill which is contrary to Christian morals and elementary human rights should be withdrawn for reconsideration makes it difficult to think that the drafters of the resolution had a whole-hearted belief in their case. We turn, therefore, to the papers[1] read by Prior McNabb of Leicester and Dr. Mooney of Preston in support of the resolution, with a desire to learn their fundamental attitude towards the problem of the feeble-minded, how they think it should be met, and how they would suggest the bill should be amended when withdrawn, as they propose, for reconsideration. We are in no way committed to the verbal inspiration of the bill, and, indeed, it seems to us that in regard to the definitions of defectives some modifications are desirable, and also in regard to the conditions which are to make defectives subject to be dealt with under the bill. Suggestions for improving the bill in these or other respects would be welcome, for it is admittedly difficult to cover by legal terminology all the cases that it is desirable should be covered without at the same time including cases which it is not intended to bring within the scope of the measure. It is with regret that it must be said that we look in vain for help of this kind. Of vigorous denunciation there is plenty, but of genuine temperate endeavour to deal with difficulties on broad and practical lines very little.

For example, we read that compulsory permanent control means life imprisonment, and that from this there would be no appeal. The provisions in the bill to safeguard the individual or to secure the frequent revision of his case are not explained, nor is any attempt made to describe the sort of arrangement it is intended to provide, and how entirely such institutions now in existence differ from the idea of a prison. But shirk it as he will, each speaker has sooner or later to admit the essential principle. One says there should be no compulsion except in rare and extreme cases, the other that segregation may be necessary in many cases, but these must admit of no doubt, and it must be in nowise a punishment. Why, then, do they not help us by showing how these objects may be attained instead of proclaiming the whole bill immoral? The two statements are really inconsistent.

There is much declamation also in regard to so-called "natural rights," which seems to imply the moral and civil right of the individual to perform any natural act without let or hindrance. The country, it is said, is asked to sanction a law which would deprive men and women of the natural right of marriage; the use of the broad term men and women without any qualification or restriction such as appears in the bill seems calculated to raise prejudice, but, be this as it may, the question the speakers ought to answer is, Do not they also mean by the segregation, which they admit is necessary in many cases, and by the protection under legislation which the resolution concedes, the restriction of the right to marry? What else than a restriction of the right of the woman is the proposal of Dr. Mooney to make it punishable for a man to make a feeble-minded woman a mother? Are the objectors prepared to maintain the view that feeble-minded persons should have unrestricted liberty to marry and bring offspring into the world?

The truth is that underlying this plea of natural right there is a fundamental confusion of ideas which was thoroughly analysed and elucidated by Professor Huxley in 1890 in an essay on *Natural and Political Rights*. In that essay he pointed out that natural rights are founded on the law of Nature, and the law of Nature is not a command to do or refrain from doing anything. It contains in reality nothing but a statement of that which a given being tends to do under the circumstances of its existence. The natural right, deduced from such a law of Nature, is simply a way of stating the fact; and there is, in the nature of things, no reason why a being possessed of such and such tendencies to action should not carry them into effect. On the other hand, there are rights expressed in moral laws and civil laws restraining each individual from acts which are hurtful and encouraging those which are beneficial to the polity of which he is a member. The crucial difference between the "law of Nature" with its consequent "natural rights" and moral or civil laws lies in this: that consistent and thoroughgoing action, based upon the law of Nature and the natural rights which flow from it, may tend to benefit the individual at the expense of all other individuals, whose needs and desires are of the same kind.

In segregating the feeble-minded society does not seek to punish them, but to protect itself and to protect them. The bill does much to save these unfortunate individuals from punishment which they are so apt to incur owing to their inability to face the stress of life, and which they do not deserve owing to their inherent instability of character. To characterize the bill as not charity but revenge merely proves a failure to grasp its aims and objects.

In addition to the misapprehensions dealt with above, there are one or two misrepresentations which ought to be corrected. One of the speakers stated that sterilization may easily get the sanction of law under the terms of this bill. This statement is no doubt based on Clause 17 (1) (*e*), which merely defines one of the conditions which may render a defective subject to be dealt with under the bill—that is to say, brings an individual under the other provisions of the bill, which contain not a single word about unsexing any one. To state, then, that this may be made to mean the unsexing

[1] *Eastern Daily Press*, August 5th, 1912.

of men and women is to twist words out of their natural and obvious meaning. Sterilization may or may not be a wise or desirable method of dealing with the problem, but, as it is not proposed in the bill, it is not fair to attack the bill on that score.

The Prior seems to be much disturbed by the growing influence of the Eugenics Society and the teachings of the late Sir Francis Galton, so much so that he is led to exaggerate not a little what they have accomplished, though undoubtedly the movement of public opinion in the direction they desire is a fact with which the Prior must reckon. But again this is no reason why their aims should be misrepresented; and, judging by their authorized publications, there is no excuse for saying that what they propose is nothing less than Malthusianism, or that they continue to think the human race will improve by methods of race suicide. The eugenists are to-day mainly searching for fuller knowledge, and to instil the idea of a newer and wider evolutional morality—namely, that in our duty to our neighbour we must henceforth include our duty to posterity.

THE PREVENTION OF THE SEQUELAE OF MIDDLE-EAR SUPPURATION.

The Section of Otology is to be congratulated upon selecting for discussion a topic of such general interest as the treatment of acute middle-ear suppuration, for the disastrous results which may attend its neglect make it imperative that such means of prevention as we have at our disposal should be recognized both by the profession and by the general public. The unanimity of opinion expressed by the various speakers on all the main points at issue cannot fail to strike any reader of the report which is published in this issue. It is true that the vexed question as to which method of treatment after natural or surgical perforation of the membrane—the wet or the dry—is the better has not been settled, but the majority of those taking part in the discussion seemed to be in favour of some such procedure as was described by Professor Gustav Alexander of Vienna—that is, to keep a gauze drain, either dry or soaked in some antiseptic solution, in the auditory canal so long as the discharge is thin, and to follow this by gentle syringing when the discharge becomes thickened by excess of mucus. All the speakers were agreed on the necessity of immediate myringotomy of a bulging membrane, and that if there were any doubt as to the condition of the antrum it should be promptly explored by means of the Schwartze operation. The performance of the radical mastoid operation on an ear in the acute stage of suppuration met with universal condemnation. The details of treatment are largely a matter of individual preference once the general principles upon which they are based are thoroughly understood—namely, the provision of free drainage and the subsequent prevention of the entrance of infective matter into the ear from without. The communication by Professor Alexander as to the value of urotropin administered internally in preventing further infection by the blood stream is worthy of serious attention and well illustrates the modern method of attacking disease from all points. Much valuable material as to the prevention of chronic middle-ear suppuration supervening on the acute attack was contained in the paper by Dr. Robert Woods. His experience at the Hardwicke Fever Hospital, Dublin, led him to formulate the theory that the fundamental difference between the acute and the chronic processes lies in this—that the former is a pure monoseptic infection, while the latter is a mixed infection, characterized by the presence of a large variety of organisms. He draws the conclusion that the chronic state can be avoided by preventing secondary infection whilst the ear is still in the condition, as it were, of an open wound. He quotes the figures of the Hardwicke Hospital to show that adequate sterilization of the external auditory canal is sufficient in the majority of instances to prevent the occurrence of chronic otorrhoea with all its possible sequelae. Whether his theory is pathologically correct or not matters little when its practicable application yields the excellent results he is able to report. Dr. Claude Rundle, who also spoke from experience at a fever hospital, raised some interesting practical points. He avoids routine treatment of the throat and naso-pharynx in scarlet fever and measles, and to this attributes the relatively low incidence of otitis at the Fazakerley Hospital. His figures certainly suggest that in this particular instance the hand of man can do more harm in trying to fetter Dame Nature than in leaving that wayward person to take her own way. Dr. Rundle also considers that the otitis occurring in the acute stage of an exanthem is as a general rule mild, rarely calling for any surgical interference, and usually quickly subsiding. The Section adopted a resolution asking the Council of the Association to use its influence to secure the appointment of skilled otologists to the staffs of fever hospitals. This does not imply that under the present conditions the ears of patients in fever hospitals are not skilfully tended; we have only to read Dr. Rundle's paper to see that such a charge would be groundless, but Dr. Woods's paper proves that much valuable work might be done by otologists at fever hospitals—work of a scientific nature which could only be achieved by men who have had a special training. Many cases, in spite of the greatest care in hospital, must be discharged with still persisting otorrhoea, which, if untreated, may end in some fatal complication. Professor Holger Mygind told the meeting that some years ago a similar proposal was carried into effect in Sweden, where also leaflets showing the danger of leaving discharging ears untreated are distributed to the public. No one who has seen the frequency of the disease, or the ravages due to its neglect, could consider such a crusade out of place in this country.

TYPHUS FEVER.

Typhus fever is a disease which is fortunately unfamiliar to most medical practitioners in this country, although it still occurs in certain large centres of population. It is widely distributed throughout the whole of Central Europe, and especially in Poland and the surrounding districts. In addition it is common in Northern Africa, in India, China, Mexico, and some parts of the United States. On the other hand, it is practically unknown in Australia, New Zealand, and tropical Africa. In all the countries in which it occurs it shows a curious tendency to be confined more or less to endemic centres, where it breaks out from time to time into epidemics of considerable severity. It is a disease which presents many features of unusual interest, both clinically and hygienically, and it has of late been the subject of extensive study, more especially in regard to its origin and causation. An interesting summary of present knowledge on the subject has recently been published by the Office International d'Hygiène Publique (*Bulletin* T. IV, 5), and it may be worth while to refer briefly to some of the more important points dealt with in that publication. In the first place there is the remarkable age incidence of the disease, which is most frequent between the ages of 15 to 30. Hitherto it has been believed that infants are rarely attacked, but Nicolle and Conseil, in the early part of this year, showed that this is not altogether the case, the real fact being that in infants the disease is so mild that it easily escapes notice, and as, in any case, the typical symptoms are not exhibited, the diagnosis is apt to be missed. This in itself is a remarkable fact, and must greatly increase the difficulties of prophylaxis. It is worth noting that in this respect

typhus presents a striking analogy with yellow fever. The seasonal incidence—namely, winter and spring—is also of some interest, and is probably correlated with the increased tendency to overcrowding during the colder seasons, as well as with the bionomics of the natural "carrier." With regard to the causal organism we are obliged to confess that it still remains in that fast-diminishing class labelled "unknown." Naturally bacteriology has had something to say in the matter, and from time to time a whole host of weird and wonderful bacteria have been announced as in some way connected with the origin of the disease. Perhaps the most remarkable of these discoveries was that of Thoinot and Calmette, who found in the blood and in the urine of typhus patients filaments of what they considered to be a mould. Even as long ago as 1860, however, micrococci were described by Hallier, and we find in this JOURNAL in 1893 a reference to spirilla by Mott and Blohre. Amongst the other remarkable organisms may be mentioned the filamented cocci of Lewaschew (1892), the diplococci of Dubief and Bruhl (1894), the piroplasma of Gotschlich (1903), and the rod-like bacilli of Rabinowitsch (1909). On the other hand, entirely negative results have been obtained by Anderson and Goldberger (1909), and by Nicolle and Conseil (1912). These references will give some idea of the wide diversity of opinion which has prevailed until the last few years. On the experimental side something much more definite has been accomplished, thanks chiefly to Nicolle and his collaborators in Tunis, and to a number of American workers. The two most outstanding results have been the demonstration that the disease can be transmitted experimentally, not only from man to man, but also to monkeys, and that the natural agent of transmission is the common body-louse. It was shown as early as 1900 by Moczukowski, he himself being the subject of experiment, that injection of the blood of a typhus patient into a healthy person gave rise to the disease. This observation has since been confirmed by several independent authorities. Experiments on animals, however, were unsuccessful until 1909, when Nicolle was able to infect a macaque monkey, which displayed all the clinical signs of the disease, including the eruption. This monkey, it may be added, was infected from a chimpanzee which had itself been experimentally infected, and the result demonstrated that the infective agent was present in the blood on the day of the eruption and at least two days before. It was also shown that the infectivity of the blood persists for a considerable time after the appearance of the eruption, in fact for the whole of the febrile period and for some time during convalescence. The chief results of the American workers have been to show that the disease known as "tabardillo" in Mexico and "Rocky Mountain spotted fever" in the United States is identical with the Old World typhus fever. They were also the first to show that the infective virus does not pass through a Berkefeld filter, and that it is located principally in the leucocytes. It was found, too, that although the virus was retained by the filter, yet the filtered serum was able to confer immunity on an inoculated animal. With regard to the natural mode of transmission of the disease, it is now almost exactly three years since Nicolle and his colleagues announced the discovery that lice are the carriers. On this point they have since obtained ample experimental evidence, which has been confirmed by the American workers. Ricketts and Wilder made the further remarkable discovery that the second generation of progeny of infected lice, although not themselves infective, appeared to be able to confer a certain degree of immunity. Finally, with regard to prophylaxis, apart from the ordinary hygienic measures which immediately suggest themselves, it has been shown that the blood serum of convalescents can confer a high degree of immunity upon persons exposed to infection, a property which might on occasion serve as a very useful preventive measure. It is thus clear that, although the actual disease producer still remains unknown, we have arrived at most of the more important biological facts in regard to what was till recently a most puzzling disease.

CONTROL OF MINERAL WATERS IN FRANCE.

ONE of the duties imposed by the French State on the Académie Nationale de Médecine, to give it its full title, is to examine applications for licences to trade in France in a mineral water, either at the place where it rises or by exportation or importation. If satisfied that the conditions under which the water is piped and collected are good and that the analysis submitted is correct, the Academy authorizes the issue of a licence, usually for a period of thirty years, and subject to the continuous observance of certain conditions. The Academy delegates the duty of investigating the claims of any new spring to a standing committee of nine of its members. The points to which the committee gives particular attention are the mineral constitution of the water, the analysis submitted being checked in the Academy's chemical laboratory, and the effectiveness of the means taken to collect the water so as to obviate risks of accidental contamination. The committee reports to a plenary session of the Academy, when a vote is taken. If the vote be in favour of the water, a licence is granted subject to certain general conditions which the Academy has laid down for its guidance; among these are that the water must be bottled at the spring, and that it must not be artificially aërated. At one of its last meetings before the holidays the Academy had before it a large batch of such reports. In fourteen cases it authorized the issue of a licence subject to the conditions mentioned above. Of these new springs, three were at Vittel and two at Vals. In the case of one application for a licence for a Spanish water it was refused on the ground that the water could have no therapeutic property. In the case of one French spring a special temporary authorization was given, but in respect of another the Academy was evidently puzzled. Thirteen years ago it had authorized a licence for the sale of the water as a mineral water. The proprietor now asked for its recognition as a table water. The Academy objected that there was no legal definition of a table water, and that it could not be expected to stultify itself by altering the designation of the water. It, however, authorized the use of another spring in the same place, which contains a fairly large proportion of sodium bicarbonate. The number of mineral water springs in France is already enormous, and how many of them are profitable to the communities or companies that own them is unknown. Not a few of them are in reality, though the Academy cannot define the term, table waters to which the weary traveller turns in the belief that the Academy does in fact exercise an effective control over their collection and bottling.

THE VIRUS OF FOOT AND MOUTH DISEASE.

THE present extensive outbreak of foot and mouth disease in this country has called attention once again to this rather remarkable disease. As in so many other cases, its etiology has been to a great extent a bacteriological mystery, the classical methods of the past thirty years having apparently proved unsatisfactory. For some reason or other, however, it has not attracted so much attention as many another disease of no greater importance; but even twenty-seven years ago Klein discovered a coccus which he isolated from the vesicles of diseased animals. He was able to cultivate this organism, and to cause infection with it. At this point, however, his investigations were allowed to drop. Eleven years later Schottelius and Kurth both obtained similar results with an organism which they considered to be a streptococcus. Here, again,

the work was not carried to any greater length. More recently Siegel has undertaken what is probably the most extensive series of investigations on this disease. Starting in 1896, he made experiments along numerous lines, but was faced with failure at every turn. His experiments having on this account been interrupted and discontinued several times, he eventually came to the conclusion that previous assumptions with regard to the nature of the causal organisms would require alteration. Starting afresh, he was able to announce in 1906 the discovery of coccoid organisms which occurred in the vesicles as well as the blood of infected animals. These were also obtained from the blood of infected animals even before the appearance of the eruption. With some difficulty these organisms were cultivated first in liquid media and later, after subculture, on ordinary agar. The growth was slow and scanty, but, once established, there was little difficulty in making further subcultures. It was found, however, that the strains cultivated from severe acute cases died out somewhat rapidly, whereas those from chronic cases were much more resistant and, in addition, retained their virulence to a greater degree. With these strains, even when subcultured as many as sixty times, he was able to produce infection in healthy animals both by the mouth and by subcutaneous or intravenous injection. Although in some cases the results were equivocal, a sufficiently large number of animals so treated displayed the typical signs and symptoms of the disease to leave no doubt in the observer's mind that he had actually succeeded in isolating its real cause. These results were challenged by Ostertag, but without much justification. With regard to the nature of the organisms, Siegel refers to them occasionally as *diplococci*, but much more frequently as *Cytorrhyctes*, and from this it may be assumed that he is inclined to regard them as protozoa, or rather as chlamydozoa. If such be the case we may expect that some sort of life-history remains to be evolved. On this point, however, Siegel has no comment to make. The forms in culture are apparently absolutely identical with those met with in the blood. Nicolaus, who has confirmed Siegel's observations on the occurrence and culture of these organisms, makes special note of the fact that each coccus appears to be composed of a large number of much smaller bodies. These investigations give the impression of being quite reliable, but pending further independent confirmation it may be advisable to reserve judgement.

THE SURVIVAL OF NERVE CELLS.

FURTHER evidence of the persistence of life and of a certain power of growth in highly organized tissues is afforded by some recent experiments on nervous structure, and M. Henneguy, Professor of Comparative Embryology at the Collège de France, last month gave a short summary to the Academy of Medicine of the observations that have been made. In 1910 Harrison, who had been at work on the subject for three years, reported that he had obtained outgrowths from nerve fibres and fragments of cranial ganglia from the tadpole kept in a drop of coagulated lymph from the frog; he observed long hyalin filaments resembling embryonic nerve fibres pushing their way into the lymph. During 1910 and 1911 Legendre and Minot communicated to the Société de Biologie a series of notes on the conservation of the cells of spinal ganglion outside the organism. The experiments were made by placing the cells of adult dogs and rabbits in defibrinated blood of the same animal. The preparations were kept at a temperature of 39° C., and constantly agitated by bubbling oxygen through them. The agitation and oxygen were used in order to prevent the accumulation of the products of metabolism in the neighbourhood of the cells. Under these conditions these observers noted the formation of processes which were often more or less deformed. The preparations might be cooled, and when the temperature was again raised to 39° C. growth would be restarted. About the same time Ramon y Cajal observed the formation of lobulations and protoplasmic buds by spinal ganglion cells simply kept in a moist chamber. In 1911 Burrows extended Harrison's experiments by placing tissue from the embryo chick in the coagulated plasma of adult fowls. He observed nerve fibres start from the morsel of nerve tissue and grow into the plasma. M. Henneguy was impelled to put this short history on record by a paper read before the Academy earlier in the month by Marinesco and Minea, who had succeeded in obtaining growths from fragments of nervous tissue taken from the rabbit and dog and preserved at a temperature of 37° C. in plasma of the same animals. For the first twenty-four hours no change was observed, then from one or more parts of the edge of the fragment short, fine filaments formed and grew in thickness and length for eight or nine days. After that growth ceased and the filaments formed broke up.

MEDICAL APPOINTMENTS IN THE EAST.

THE article on medical appointments in the East, published May 23rd last, which was reproduced in several Far East newspapers, has brought us certain letters, some from old stagers and others from men whose experience of medical life in the Eastern tropics, either in Government service or as employees of companies, does not extend beyond a year or so. Summed up, the evidence all goes to show that numerous grounds for more or less legitimate discontent exist, and that the probability of matters being improved would be considerably increased by all medical men already resident in the East joining the local Division of the British Medical Association and making a point of inducing all newcomers to do likewise. An interchange of experiences at local meetings would serve to bring various sources of discontent into true focus and eventually suggest those in respect of which common action might usefully be taken. Meantime, it is clear that, though a good many medical men whose physical and mental temperament suits them to grapple successfully with the special difficulties of life in hot and only semi-civilized countries eventually find themselves in satisfactory positions, a larger proportion than should be of those who go out regret their choice of a sphere of labour, and either continue in it against their inclination or abandon it after comparatively brief experience. Some of the reasons for this state of affairs are fairly plain. Many men accept appointments on rubber, tea, and other estates without thoroughly informing themselves as to the nature of the work they are undertaking or the conditions in which they will live, even so far as to realize the purchasing power of the salary offered them. They also conclude that "free quarters" necessarily means a furnished house suitable for a man and a young wife, and that "private practice allowed" means that such practice is always available and remunerative. Others are men who would find an isolated medical life little to their taste either at home or abroad, and regard all its drawbacks as the outcome of their own immediate environment. Finally, there are a few who expect to get to the top of the tree forthwith, and are naturally disappointed. Up to the present a medical appointment on an estate is not every man's job; many of the companies running them are still in a struggling stage, and necessarily endeavour to keep expenses down to the lowest possible point; the home managers of others have small conception of the discomfort in which the employees live, and many, though beginning to recognize the importance of medicine in commercial undertakings, are still disposed to regard medical men as well paid when they receive the salaries such as are usually paid to young men employed in ordinary executive billets in the same enterprises. It is the latter belief in particular that the profession must first set itself to combat.

SLEEPING SICKNESS TRYPANOSOME IN ANTELOPES.

In the BRITISH MEDICAL JOURNAL of April 27th, 1912 (p. 969), a somewhat lengthy reference was made to the discovery that in Northern Rhodesia various species of wild game serve as a reservoir for human trypanosomes (*T. rhodesiense*), and we ventured to suggest that an analogous condition would probably be found to exist in Uganda. As a matter of fact this suggestion had already been forestalled a fortnight earlier in a communication by Dr. H. L. Duke read before the Royal Society, but which at that time had not been published. Dr. Duke's experiments were conducted almost simultaneously with those of Kinghorn and Yorke in Rhodesia, and in September last he first obtained evidence that a particular species of antelope, Situtunga (*Tragelaphas spekei*), on Damba Island was naturally infected with human trypanosomes (*T. gambiense*). In November he was able to confirm this observation. None of the other animals examined—and these included the waterbuck, bushbuck, hippopotamus, and buffalo—were found to harbour *T. gambiense*, nor, with one exception, any form of trypanosome. The Situtunga, however, were infected with *T. uniforme* and *T. ingens* (in addition to the human form), and this fact, necessitating as it did repeated inoculation experiments, rendered diagnosis and identification much more tedious than in the case of *T. rhodesiense*, where identification could be established on morphological grounds alone. From these observations we may therefore conclude that the continued infectivity of the tsetse flies on Damba Island is to be explained by the fact that the Situtunga are acting as reservoir hosts, and it may be expected, although no positive evidence is yet forthcoming, that on the mainland the various species of antelope are playing a similar part. Having regard to the fact that the Royal Society Commission showed that the waterbuck, bushbuck, and reedbuck could be readily infected with strains of *T. gambiense*, such a supposition appears to be quite justifiable. It seems well to note a point remarked on by Fraser and Duke in an earlier communication, namely, that the antelopes infected by the Commission remained infective for over a year without developing any sign of sleeping sickness, either clinically or pathologically. A further communication by Dr. Duke, confirming his diagnosis of *T. gambiense*, was read before the Royal Society on June 6th.

THE GALVANOMETRIC DETERMINATION OF UREA IN URINE.

WUNDER described in 1909 a simple method of determining quantitatively the concentration of electrolytes and of urea in human urine by means of the galvanometer. It was carried out by allowing a constant current from five accumulators to pass through a hypodermic syringe kept at 15° C. From the direct readings of the galvanometer (milliampèremeter) the observer could calculate the salt content of the urine by using an empirical formula; by deduction of the specific weights of the concentration of electrolytes found from the specific weight of the urine, the concentration of the non-conductors (practically of urea) could be calculated. Wunder has recently discussed the limitation of error of this method.[1] The urea content of urine as measured by this method was compared with the values found by the determination of the N content (Kjeldahl). When the galvanometric determination was carried out at 15° C. the urea values were about 8 per cent. too high in normal urines, but practically correct when measured at 16° C. In pathological urines the readings at 15° C. were about 13 per cent. too high. The values determined at 17° C. corresponded to those found by Kjeldahl. This behaviour was found to be due to the presence in urine of a larger quantity of non-chloride conductors than is usually accepted. According to Vierordt the normal value of sodium chloride is 1.1 per cent., and of non-chlorides 0.8 per cent. instead of 0.48 per cent., the percentage usually given. This accounts for the error being greater at the lower temperature. At 16° C. it is negligible. After analysing all his data Wunder asserts that under normal conditions the galvanometric examination of urine at 16° C. yields within a few minutes reliable results in regard to electrolytes and non-conductors, and that when there is marked retention or excessive excretion of sodium chloride, the method, combined with a chemical chloride determination, is the simplest and most rapid way of ascertaining the electrolyte and urea content of urine.

[1] *Münch. med. Woch.*, May 14th, 1912.

THE NEW CAPITAL OF INDIA.

THE Delhi Town Planning Committee has very carefully studied the site known as the Durbar area, and has had an opportunity of seeing the ground after a heavy fall of rain. The ground has also been under the observation of the special sanitary officer attached to the committee and of the Sanitary Commissioner with the Government of India. It is understood that after consultation with these officers and after study of the data collected in regard to flood and subsoil water and of other general considerations of importance, such as the extent of the land required, the committee has come to the conclusion that so much of this area is unsuitable for the purpose that the amount remaining will be insufficient for the requirements of an imperial city. The site which commends itself to the committee is the area to the south of Delhi and west of the more ancient cities; it offers a combination of conditions favourable to health and good drainage, together with the aesthetic advantage of fine views over the present city of Delhi and the monuments of the Delhis of the past. The committee has drawn up a comprehensive "lay out" plan of the new capital, which, it is understood, has been accepted. A small local government will now be created at Delhi, and the preparation of the projects will be taken in hand. The experts were assisted by officers of the Indian Public Works Department, and the Government of India has decided to invite architects and others residing in India to submit competitive designs for residences of officials of various grades at Delhi. A committee, assisted by the consulting architect to the Government of India, will examine the designs, and liberal premiums will be awarded to successful competitors. One of the conditions of the competition will be that the competitor shall certify that his designs and drawings were prepared in India by him or under his direct supervision. The drawings will be publicly exhibited after the committee has made its award. It is hoped by the early construction of a number of permanent residences from designs selected at this competition to reduce expenditure on the provision of temporary quarters. The Delhi Municipal Committee has applied to the Punjab Government for the services of an Indian Medical Service officer as health officer for Delhi, to whom definite executive responsibilities could be entrusted. It is proposed to give him an establishment costing two lakhs of rupees annually, with a view to introducing a more sanitary state of affairs than now prevails in the city that is to be the capital.

PROFESSOR SEWAKI, of Tokio, has made a compound of urea and quinine which, he states in the *Sei-i-Kwai Medical Journal*, possesses very marked analgesic properties. A 2 per cent. solution injected subcutaneously produces complete local anaesthesia in from five to seven minutes. The compound, to which he has given the name "masuisin," also acts as an antiseptic, so that solutions can be kept indefinitely.

Ireland.

[FROM OUR SPECIAL CORRESPONDENTS.]

DECREASE OF INSANITY IN BELFAST.

DR. GRAHAM has recently issued his report on the Belfast District Lunatic Asylum for 1911. Of the patients admitted during the year 90 were males and 134 females; the numbers under treatment were 675 males and 799 females. There were 41 deaths in males and 63 in females, and the discharges were—males 53 and females 77. Dr. Graham draws attention to the pleasing fact that the admissions were 17 per cent. fewer than those of the previous year, and is of opinion that we have at last reached a turning point in the increase of mental disorders. He gives the credit to the better general hygiene, the progress in preventive medicine, and the social amelioration of the poorer classes. The interests of sanity are better safeguarded than before, and the beneficent effects are to be looked for in the lessened numbers claiming admission to asylums. He hopes that the Mental Deficiency Bill will be extended to Ireland; the villa colony system, on which the new asylum at Purdysburn is being built, is admirably suited to meet the requirements of such a bill. The great benefit of out-door farm work is insisted on, and the improvement due to the villa colony system is described. The cost per head is one of the lowest. Dr. Dawson, the inspector of lunatics, remarks that at his visit 1,001 patients out of a total of 1,186 were engaged in some sort of work.

TUBERCULOSIS SANATORIUMS.

At a meeting of the Roscommon County Council last week it was unanimously decided to erect a sanatorium for the county and to appoint a medical officer at £400 a year, his duties to be confined to looking after the patients in the sanatorium. At the last meeting of the Dublin Joint Hospital Board a surveyor was appointed to prepare the bills of quantities for the additions to the Sanatorium for Consumption at Crooksling. The total cost of the Crooksling scheme will be about £30,000, and it is expected that the institution will be in full working order in six months. The Dublin County Council has resolved to ask the Local Government Board to hold an inquiry to elicit the views of the different districts, in the hope of arriving at a decision equitable to all parties.

POISON BOTTLES.

The following changes have been made by the Lord Lieutenant and Privy Council in the regulations regarding the sale of poisons; the words "not to be taken" must be printed on the label, and the bottle or other container must be rendered distinguishable by touch from ordinary bottles or containers.

The Coroner for the City of Dublin held an inquest at Jervis Street Hospital last week concerning the death of a man, aged 68, who died in the hospital on August 14th. It appeared from the evidence that the patient, who had been in the hospital for some time suffering from heart disease, and in an extremely weak condition for some days previously, was given a dose, supposed to be house mixture, by a nurse at 7 o'clock. Later, the house-surgeon was called, and found that the man had vomited; his pupils were contracted, and his pulse weak. The stomach was washed out, and the customary measures were resorted to in order to restore the patient, but he succumbed in about an hour. It was found that the dose given was taken from a bottle containing creolin, instead of from that containing house mixture. The pharmacist of the hospital stated that the disinfectant in the bottle was supplied by a wholesale house in tins, and that he put it in the bottle. It was not a scheduled poison, and was only labelled for precautionary purposes. The jury found that the patient died from taking creosotic acid or some other constituent of tar oil, administered by mistake for another medicine, exonerated the nurse from all blame, and suggested that all bottles containing other than medicines intended for patients should have some distinctive mark, either of colour or shape.

Scotland.

[FROM OUR SPECIAL CORRESPONDENTS.]

ANNUAL REPORT OF THE MEDICAL OFFICER OF HEALTH FOR EDINBURGH.

THE annual report of the Public Health Department of the City of Edinburgh for the year 1911 has just been issued. In his introductory letter Dr. Maxwell Williamson urges the necessity for a more frequent census of the population. He points out that, according to the ordinary methods of calculation, the population of Edinburgh ought to have been 365,543, but the census returns show that the actual population was 320,769. The death-rate was 14.4 per 1,000, the lowest death-rate ever recorded in Edinburgh. The number of notifications of infectious disease, excluding phthisis and cerebro-spinal meningitis, gave a ratio of 6.1 per 1,000 of the population, as against 7.1 in 1910 and during several preceding years. There were 1,075 cases of scarlet fever with 24 deaths, as against 1,512 with 42 deaths in 1910. Attention is called to the comparative immunity which Edinburgh has enjoyed for some years past from enteric fever. During 1911 only 31 cases were notified, 7 of which occurred in a close in the Canongate, where were a number of insanitary dwellings, now closed as unfit for occupancy. Thirty years ago there occurred in one year over 600 cases with 70 deaths; in 1911 only 31 with 3 deaths.

Infant Mortality.

Under the Notification of Births Act 283 ladies visit the poorer classes of the city to advise as to the rearing of infants in the early months of their lives. During 1911 the infant mortality-rate was 115 per 1,000 births. The question of supplying milk free of cost to mothers in the poorer districts, where infantile mortality is so excessive and where there is difficulty in procuring a sufficiency of nourishment, is, it is said, one for very serious consideration.

Phthisis.

The number of notifications of phthisis during the year was considerably in excess of those at any previous period. This was probably due to the activity of the Victoria Dispensary; its authorities have been carrying out an examination of the relations of patients who come under care, and in consequence a larger proportion of persons affected with the disease in its initial stage have been the subjects of notification. The notifications under 14 years of age were almost exactly double the number in the previous year. The phthisis death-rate during 1911 was 1.22 per 1,000, the same figure as during the preceding five years; this rate was the third lowest among the eight large centres of population in Scotland. The demand for the reception of advanced cases was constantly in excess of the accommodation provided. Six additional open-air shelters were provided for male patients, but additional accommodation will be required for female patients. A special report on the question of treating phthisis in all stages is now in the hands of the Public Health Committee.

Population.

Between 1901 and 1911 the male population diminished by 1,398, while the female increased by 4,257. The net increase is only 0.9 per cent., as contrasted with 15 per cent., which would have been the rate of increase of the estimated population calculated on the rate obtaining during the decade 1891–1901. Thus the progress of the population has experienced a serious check, and the fact is emphasized by contrasting the rates of increase in other large towns in Scotland. In Greenock the rate of increase between 1901 and 1911 was 9.0, in Paisley 6.4, in Aberdeen 6.2, in Perth 5.5, in Leith 3.9, in Dundee 1.21, and in Glasgow 1.1. There were 71,323 houses inhabited, and 5,346 unoccupied habitable houses.

Births, Marriages, and Deaths.

There were 2,850 marriages, as compared with 2,730 in 1910 and 2,795 in 1909. The birth-rate for the year was 21.2 per 1,000 of the population, the lowest yet attained. There were 103.9 girls to every 100 boys, and the percentage of illegitimate to the total births was 9.28.

The death-rate mentioned—namely, 14.4 per 1,000 persons living—is the lowest of any of the large towns

of Scotland. The death-rate of Edinburgh in 1861 was 23.15, in 1871 it was 27.86, in 1881 it was 18.86, in 1891 it was 20.12, in 1901 it was 17.77, and in 1911 it was 14.4. The infectious diseases death-rate, excluding phthisis, was 0.86 per 1,000.

Poor-Law Administration in Glasgow.

The statistical report by the Inspector of Poor to the Parish Council of Glasgow for the six months ending May 13th, furnishes some interesting figures. The applications for relief during the six months the report covers numbered 13,889, and 2,789 of the cases were new.

Much good work is done by the Children's Relief Committee; under the Children Act proceedings were taken against 302 persons. Of these 209 were charged with desertion, 24 with ill-treating and neglecting their children. The Children Act 1908, Part I Infant Life Protection, works well in Glasgow and strict supervision is exercised by the Infant Protection Visitor, who paid 965 visits. In connexion with advertisements appearing in the Glasgow newspapers, the proprietors of these papers refer those answering the advertisements to the parish authorities who make inquiries as to the suitability of the guardians. No fewer than 55 undesirable guardians were prevented from taking charge of infants during the half-year. In all 2,559 persons belonging to the parish of Glasgow were confined in asylum or boarded out; 1,033 cases of phthisis were treated with 189 deaths.

England and Wales.

[*FROM OUR SPECIAL CORRESPONDENTS.*]

PORTSMOUTH.

Memorial to the late Dr. C. C. Claremont.

A handsome tablet of Sicilian marble with gilt Mosaic border has been placed in the main corridor of the Royal Portsmouth Hospital. This position in a building where he did excellent work for many years is most appropriate. It bears the following inscription:

To the Memory of
Claude Clarke Claremont, M.D., B.S.Lond.
Born 11th June, 1854. Died 30th April, 1911.
He was actively engaged in the work of this Hospital
for many years and filled successively the offices of
House-Surgeon, Out-Patient Medical Officer,
Assistant Physician and Physician.
A trusted adviser. An enthusiastic worker.
A man much beloved and highly esteemed.
As a token of their sincere regard and in remembrance
of a beloved comrade, his colleagues and friends
have placed this tablet.

MANCHESTER AND DISTRICT.

The Early Notification of Births Act.

About eighteen months ago the Sanitary Committee of the Manchester Corporation passed a resolution recommending the City Council to adopt the Early Notification of Births Act for Manchester. This was strongly opposed by the medical profession generally, and the Joint Committee of the Manchester and Salford Divisions of the British Medical Association circularized the members of the City Council, pointing out the objections to the adoption of the Act. As a result the Council rejected the recommendation of the Sanitary Committee by a substantial majority, and it was thought at the time that the matter was finally disposed of. But a few weeks ago the Sanitary Committee, in accordance with a request of the Infant Life Preservation Subcommittee, again resolved to recommend the Council to adopt the Act, and instructed the Town Clerk to take the necessary steps. The matter came before the Council in a preliminary form at its August meeting, but the question will only be discussed and decided at the next meeting early in September. In the meantime representatives of the Joint Committee of the Divisions have waited on the Infant Life Preservation Subcommittee and explained fully the objections of the profession to the obligations which the Act imposes on medical practitioners. Apparently this has not altered the opinion of the subcommittee, which has reaffirmed its recommendation. It is understood that opposition will again be raised in the Council meeting, as a considerable number of members of the Council agree with the profession in opposing the adoption of the Act.

WALES.

The Toning of Milk.

In his quarterly report to the Monmouthshire County Council, Mr. D. R. Thompson, analyst, stated that twenty-two of the samples of milk taken were found to be adulterated, in all these cases the proportion of fat was deficient, but only in one case was it shown that water had been added. The custom would now appear to be to add separated milk in place of water, a practice known as "toning." It is possible to carry out this practice on a large scale, because the official standard of fat is 3 per cent. If the percentage of fat in milk of average composition be taken as 3.48, the margin allowed admits a fairly liberal addition of separated milk.

India.

[*FROM OUR SPECIAL CORRESPONDENT.*]

The Annual Indian Medical Service Dinner at Simla.

The annual dinner of the Indian Medical Service was held at the United Service Club, Simla, on June 24th. There were present Surgeon-General Sir C. P. Lukis, in the chair; Colonels Lyons, Bamber, Hendley; Lieutenant-Colonels H. Smith, Garvie, Wilkinson, Seton, James, Blenkinsopp, Carr, White, and Browning Smith; Majors Granger, Gibbs, Robertson, Jay Gould, Austin Smith, and Bennett; Captains McKendrick, Patterson, C. Melville, S. Webb, Lister, Leonard, Tressider, Munro, Needham, Mills, Barrow, M. Puri, H. Crossle, and Grisemont. The guests were General Sir Robert Scallon, Surgeon-General Sloggett, and Colonel Firth.

Indian Research Fund Association.

In the course of his budget speech last cold weather, Sir Harcourt Butler announced the establishment of "The Indian Research Fund Association." The Government of India have now drawn up rules and regulations for its working. Its objects are declared to be the prosecution and assistance of research, the propagation of knowledge, and experimental measures generally in connexion with the causation, mode of spread, and prevention of communicable diseases. The governing body constituted as follows: President, the Hon. Member of the Governor-General's Council in the Department of Education; Members: the Secretary to the Government of India (Department of Education), the Director-General, Indian Medical Service, and Sanitary Commissioner with the Government of India, the Director of the Central Research Institute (Kasauli), the Statistical Officer to the Government of India in the Medical and Sanitary Departments, the officer in charge of the Malaria Bureau, with the Assistant or Under Secretary to the Government of India in the Department of Education as secretary. The members of the association are of two classes—permanent members and temporary.

The permanent members are the president and members of the governing body, and every donor of Rs. 500 and upwards.

Temporary members are members of the working committee, and every subscriber of Rs. 100 and upwards annually. The governing body will appoint a "scientific advisory board," of whom not less than three are to be members of the governing body, to examine all proposals in connexion with the scientific objects of the association. The scientific objects of the association are to be carried out with the aid of the "working committees," appointed by, and working under, the direction of the "scientific advisory board."

A general meeting of the association is to be held once in every year as soon as possible after the preparation of the annual accounts.

MEDICAL MISSION HOSPITALS.

The Victoria Hospital, Benares, belongs to the Zenana B ble and Medical Mission, and is superintended by Miss Janet M. C. Gray, L.R.C.P. and S.Edin. The patients are exclusively women and children; 485 in-patients and 4,387 out-patients were treated and 149 surgical operations performed during the year 1911. The training of native nurses is an important part of the work of the hospital.

The Ballard Memorial Hospital, Janupur, belongs to the same society, and may be considered a branch of the Benares institution; 129 indoor and 3,271 outdoor patients were treated in 1911, and 29 operations performed. The great majority of patients treated in both hospitals are Hindus, but a considerable number of Mohammedans and Christians attend. Religious exercises constitute a prominent part of the work.

SNAKE-BITE TREATMENT IN THE CENTRAL PROVINCES.

According to a recent report, the number of deaths due to snake-bite in the Central Provinces is stated to have been 1,244 during 1911, notwithstanding efforts to popularize the Lauder Brunton method of prevention. Colonel Dennys, the Inspector-General of Civil Hospitals, has investigated the history of the potassium permanganate treatment in the Provinces, and he reports that, of the total number of cases in the last six years, there were only 5 which can be looked upon "as more or less authentic cases of bites by *poisonous snakes* treated by the Lauder Brunton method alone." Even in these instances, Colonel Dennys adds, it is not absolutely certain that recovery was solely due to the treatment. The experiments at the Bombay Bacteriological Laboratory to test the efficacy of the permanganate have also proved most discouraging, and the Inspector-General does not recommend the adoption of measures for extending the use of the lancets. The Chief Commissioner concurs in this view, and considers that, while experiments may be continued at places already provided with the apparatus, it would not be advisable to advocate a more extensive use of treatment of such doubtful value. It might be added that it is highly desirable that the whole question should be removed from the region of doubt. If the potassium permanganate treatment is useless, an authoritative statement to that effect would prevent the existence of illusions as to its efficacy.

WOMEN DOCTORS FOR INDIA.

At a meeting of the Countess of Dufferin Fund Central Committee, and of the Victoria Memorial Scholarship Fund Executive Committee, held recently at the Viceregal Lodge, Simla, the scheme for a women's medical service in India was further discussed. The leading Parsee journal has criticized unfavourably the scheme of the Government of India for organizing a service of women doctors for India on the lines of the Indian Medical Service. It points out that the Parsee community has always been forward in recognizing the need for the extension of medical relief and medical aid in India, and has equally readily acknowledged the need for a service of women doctors in a country where the traditions of centuries and the instinctive conservatism of the people have hitherto made the female portion extremely reluctant to resort to hospitals and dispensaries for medical advice. The institution of a few well-paid appointments carrying attractive emoluments and the freedom of private practice will not, it is contended, meet the need. It goes on to say that—

> Those who have had any insight into the working of the present Indian Medical Service know the difficulties and dangers attendant upon a system under which men entirely unfamiliar with Indian conditions come out with academic qualifications in medicine to work as doctors in hospitals and surgeons in civil stations. Would these difficulties and dangers be any the less—nay, would they not be aggravated a hundredfold—in the case of English lady doctors who may be attracted, not under the most favourable of circumstances, to the chances of service so far away from home? What we want is not the organization of a corps of a limited number of lady doctors from England who may make a rich living out of their high salaries and a flourishing practice amongst the upper classes of Indian society, but the institution of a large number of Indian medical women—maybe under the control of the Indian Medical Service—who may be in a position to carry medical aid and relief to that large class of Indian women who are reluctant to take advantage of hospitals managed by male doctors.

Correspondence.

THE BEZOAR STONE.

SIR,—The price of bezoar, as quoted by Guibert, is absurdly low. Any one who could have bought it at £2 10s. would have speedily made a fortune, for the bezoar stone is extremely rare. It is found, according to some naturalists, in the hearts of stags, and is said by Bontius to be the alvine concretion of goats or gazelles; but others, according to Serapion—extremely cunning naturalists—say that it is found in the stomach, or rather the omasum, of the animal they call Cervicapra. Avenzoar, however, gives the true account of its origin:

> That, says he, is best which is found in the East, near the eyes of stags. Great stags, in those countries, eat serpents to make them strong, and before they receive any hurt from them run into streams of water, and go into it so far that it comes up to their heads; this habit they have from natural instinct, and there they continue without tasting the water (for if they should drink it they would immediately die) till their eyes begin to trickle; this liquor, which oozes out under their eyelids, thickens and coagulates, and continues running till it increases to the bigness of a chestnut or a nut. When these stags find the force of the poison spent, they come out of the water, and return to their usual haunts; and this substance, growing by degrees as hard as a stone, at last, by frequent rubbing, it falls off.

Is it any wonder that this substance was almost priceless as a medicament; and can any one doubt Abdalanarac when he records that the palace of Corduba was given for one of these stones? Friar Bacon was a firm believer in the virtues of bezoar, but though he was profligate and reckless in his expenditure on scientific material, and ruined himself thereby, I never heard that he purchased a bezoar. It was doubtless beyond his means. The only drug that approached the bezoar stone in value was the jewel called aetites, that is found in an eagle's nest. It has rings with little stones within, and if tied to the arm and left side prevents premature delivery, and brings love between a man and his wife.—I am, etc.,

Wn. Channel and Bay, Aug. 17th. CHAS. MERCIER.

EXPERIENCE OF THE "DIORADIN" TREATMENT.

SIR,—I regret that Dr. Bernheim considers that the test to which I submitted the dioradin treatment was unfair. In my report I gave the type and stage of the disease in each case; I selected different types so that the many claims in favour of dioradin might be tested. It seemed to me to be necessary that the diagnosis should have been proved by the discovery of tubercle bacilli in the sputum.

I have read two of Dr. Bernheim's communications—that of March, 1911, made to the Société Internationale de la Tuberculose, and that read at the French Medical Congress on October 24th, 1911. Though the clinical details are scanty I cannot but conclude that many, if not most, of the cases of proved pulmonary tuberculosis recorded by Dr. Bernheim as evidence of the success of the treatment were examples of the disease in a stage quite as advanced as those selected by me.

The improvement during the treatment is ascribed by Dr. Bernheim to the dioradin, but it is so common to find that patients admitted into hospital improve markedly without any special treatment that I feel quite unable to accept evidence of temporary improvement in favourable circumstances as proof of the specific curative action of the preparation. Dr. Bernheim is doubtless familiar with what Professor Rénon terms "the normal coefficient of improvement" of tuberculous patients when they are placed under any special treatment, whatever its nature, provided that it is not actually harmful. M. Laumonier translates this into figures, showing that any new special treatment is able to claim 65 to 71 per cent. of cases cured or improved and 35 to 29 per cent. stationary or worse.

MM. Matthieu and Dobrovici showed the wonderful efficacy of daily hypodermic injections of 1 c.cm. of normal saline solution if combined with a certain amount of therapeutic suggestion.

I await anxiously the promised communication of Dr. Bernheim, and I trust that more details will be given than have been included in the reports published hitherto.

I think that if dioradin acts specifically in the cure of tuberculosis, Dr. Bernheim will be able to produce records of cases showing:

1. Conclusive evidence of tuberculosis at the beginning of the treatment.
2. The type and stage of the disease.
3. Any factors that may have contributed to the improvement other than the injections of dioradin.
4. The evidence of improvement or cure.
5. Evidence that the improvement has been maintained for a period at the least longer than three months.

I hope, for instance, to learn the subsequent history of the patients treated by Dr. Bernheim between September, 1910, and January, 1911, and published by him in his first communication in March, 1911. In the second communication of October, 1911, Dr. Bernheim only alludes briefly to these patients, saying that all remain well save three; of the three, one had died, though the date of the death is not given; the original report of this case records very satisfactory improvement up to February 27th. The other two still had tubercle bacilli in the sputum, but further details are not provided.

A few cases well reported and showing persistent improvement over a considerable period of time would do more to tempt me to test the treatment again than the long series of records stating that tuberculous patients had a number of dioradin injections and were better at the end of one, two, or three months.

At present my own experience of its use leaves me sceptical as to its value, and Dr. Bernheim's published reports so often fail to give the information necessary to form a judgement that my scepticism has not been shaken by them.

Nothing would give me greater pleasure than the discovery of a cure for tuberculosis, but nothing is more repugnant to me than the raising of false hopes in unfortunate sufferers from this disease. If Dr. Bernheim wishes to persuade his colleagues of the specific curative action of dioradin, I think that he should explain fully "the solid and precise scientific base on which the therapeutic method reposes," and produce proofs that a series of cases treated by it had improved, not only at first, but had maintained the improvement for a year or more.—I am, etc.,

London, W., Aug. 19th. CECIL WALL.

ORGANISMS CULTIVATED FROM THE LESIONS OF HUMAN LEPROSY.

SIR,—In a paper entitled "A Critical Study of the Organisms Cultivated from the Lesions of Human Leprosy, with a Consideration of their Etiological Significance," in the *Journal of Infectious Diseases*, 1912, xi, pages 116 to 139, Duval and Wellman have incurred some inaccuracies which I wish to rectify.

On page 125 it is distinctly stated on two occasions that my culture of leprosy is chromogenic. This I cannot confirm; the culture belongs to the so-called "tubercle" group, is a moist, ivory-white, slow-growing wrinkled culture, to the naked eye practically indistinguishable from avian tubercle. It might exceptionally produce pigment, but that so rarely that it cannot be considered as a chromogenic bacterium, such as *B. phlei*, or the acid-fast bacteria isolated from milk by Tobler, and Nabarro, and from dung by Moeller, to which group of saprophytes Duval's culture also belongs.

Duval and Wellman mention several animal experiments they have carried out with my culture. The time of observation (three months) is too short to allow a definite conclusion to be arrived at. Moreover, as Professor Duval has informed me in a letter dated May 10th, 1912, that the culture I sent him died out, there is no possibility of knowing whether these authors were working with living cultures.

To this must be added that their agglutination experiments were carried out with a strain of my culture which they again repeatedly call "chromogenic." In the course of a year and a half I have not seen my culture produce any pigment, though it has been placed on the most varied media: it must, therefore, be left an open question whether they were working with my strain at all.

A remarkable fact in these agglutination tables is also that the "tubercle" group (human, bovine, avian tuberculosis) does not agglutinate in a constant or at least falling ratio, as is to be expected in any "group" reaction. This is quite clearly shown in the serological tests done by several workers under Much, of which a short summary can be found in the *Transactions of the Society of Tropical Medicine*, 1912 (p. 175). I made the same observation in the course of my complement absorption tests; in fact, it is extremely difficult, or nearly impossible, so far to differentiate satisfactorily bovine from human tubercle, even if the antigens are properly titrated before use. On the other hand, we find in Duval and Wellman's experiments that a leper serum agglutinates 1 in 40 with human and 1 in 10 with bovine tubercle; another, 1 in 20 with human, but 1 in 80 with bovine; another, again, 1 in 150 with human and 1 in 40 with bovine tubercle culture emulsion. It would seem that something was wrong with the bacterial emulsions used, otherwise they would have given more constant results. This is such a well-known fact to any one who has tried to differentiate the "tubercle" group by means of serological tests that it need not be insisted upon.

Further, in the same paper (p. 120) it is stated that the branching, filamentary and diphtheroid organisms which Kedrowsky and also Bayon have recovered from cases of leprosy are contaminators. This may or may not be the case, time alone will show the correctness or otherwise of our views. The fact remains that Kedrowsky's and also Bayon's strains are capable of producing in rats and mice visceral lesions indistinguishable microscopically from those occurring in spontaneous visceral leprosy of rats and human beings, and different *toto coelo* from anything that can be produced by any other similar bacterium. Neither Clegg's, Duval's, or Rost's culture have succeeded in producing anything but the lesions that could equally well result after injection of saprophytic bacteria of the Grassberger or Moeller's dung "bacillus" group.

I have refrained so far from publishing elaborate descriptions of my microscopical sections, and have preferred to demonstrate them to societies and meetings. On every occasion the general opinion was that the specimens demonstrated were absolutely unlike anything seen before. I refer to the discussions at the meeting of the Society of Tropical Medicine on February 16th, 1912 (*Transactions*, pp. 195 and 199), and at the British Medical Association meeting in Liverpool this year.

In another paper (which, however, I only know from the summary given in the *Journal of Tropical Medicine*, 1912, No. 14, p. 221) Duval and Wellman appear to consider that the culture of *B. leprae* on placental extract agar is an original method of their own. Kedrowsky, however, fully published the process in 1901 (*Archiv für Hygiene*, xxxvii, p. 55).

Moreover, we are informed in this paper that the authors have succeeded in cultivating on placental-extract-agar the acid-fast organism of rat leprosy. Seeing that Duval's first human lepra culture has so far been unable to produce any leprous lesions in animals, and shows all the characteristics of a saprophytic acid-fast (growth at room temperature on simple gelatine, experimental animal lesions, extremely easy to regain even on common agar after injection into animals), it would be advisable to await the results of conclusive animal experiments before considering the organism to be a culture of lepra murium.

In conclusion, I should like to call attention to a short paper by Dr. MacLeod in the *Proceedings of the Royal Society of Medicine* (Dermatol. Sect., 1912, v, 142–144) on a case of maculo-anaesthetic leprosy in a woman, aged 25. The bacterial extract mentioned in this paper can now be supplied free of expense in sufficient quantities, for trial on selected cases, by applying to me at the Lister Institute.—I am, etc.,

H. BAYON,

London, S.W., Aug. 14th. Beit Memorial Research Fellow.

THE INTERIM REPORT ON TUBERCULOSIS.

SIR,—The action of the recent meeting of Representatives in regard to the administration of the so-called sanatorium benefit may be most praiseworthy from the public point of view; but it is to be hoped that it will not be taken by the public as a professional and scientific endorsement of the Government policy as outlined in the Interim Report of the Departmental Committee on Tuberculosis, commonly quoted by the name of its chairman as the Astor report.

At a moment when there appears some chance of a national attack upon the roots of the disease a Governmental Committee recommends a vigorous lopping of the twigs and branches. It is as if, when a surgical operation is absolutely and urgently necessary, the physician should recommend sedatives and anodynes. It looks as if, paralysed by the magnitude of its task, and afraid of unpopularity if it suggested the proper remedy for this national evil, the Committee had fallen back upon the same old palliatives which have proved so inefficacious for the past half-century.

There is absolutely nothing novel and nothing with a national aspect in the whole of this report from beginning to end, and the calculations as to expense and numbers of beds requisite are ridiculous. There are over 50,000 deaths annually in the country from pulmonary tuberculosis, and the report states on page 26:

> Some 9,000 beds would seem to be required for the purposes of observation, treatment, education, and isolation. . . . How many of these 9,000 beds will require to be provided depends upon the number of available beds already in existence which are not now being utilized for the treatment of tuberculosis.

What good purpose can be served by such an inadequate estimation as this? It is easy to predict the bad results which will follow as a result of the wave of bitter disappointment which will sweep over the country after the ignominious failure of such a puerile scheme.

For each death annually from pulmonary phthisis there exist at least three cases in an open infective condition who are a danger to their fellow countrymen. The disease can only be properly tackled when these dangerous patients are segregated from the healthy. This means the provision of 150,000 to 160,000 beds, or, better put, institutional accommodation for 150,000 to 160,000 people, at a capital cost of about 15 million pounds. This is what the Government ought to be told, instead of being lulled to sleep with a fable about 9,000 beds. The sooner the 15 millions are raised and the problem properly attacked, the more economical will the result be to the nation. The treatment on such lines of the problem of tuberculosis is a sound financial proposition for any nation, however large the outlay may seem to be at first sight. In various ways the nation is spending treble as much to-day in methods which foster tuberculosis and cause it to flourish.

The keynote of the report is the early diagnosis and treatment of tuberculosis, and from the preventive point of view the note is an utterly false one; no disease ever was, or ever will be, eradicated by treatment of cases, early or late. It is the late cases which ebb and flow in a ceaseless tide in and out of the gates of our workhouses and hospitals which propagate and maintain tuberculosis. The first essential in any crusade against tuberculosis is the reform of our Poor Law, and provision for proper care of those unfortunates who, strange to say, are wholly missed by the Insurance Act, or, if included, given least relief under it.

There is no reasonable attempt made in the report to show how the present muddle of Government officials, under Board of Education, Board of Trade, and Local Government Board, should be organized into one effective unit under a Board of Health, and then extended to fight against dangerous cases of this infectious disease. There are only directions given for the perpetration of an additional muddle in the shape of cordons of cheap dispensaries all over the country.

It is about time that some one told the Government that the early cases require usually no more treatment than plenty of good food and release from unsuitable work so as to give time for rest and exercise in the open air. Under such conditions the vast proportion of them will do as well and often better under their own practitioner than in a sanatorium, and he also can instruct them in domestic hygiene just as well as a dispensary official or visitor.

If such an early case should become openly infectious, and commence to discharge sputum laden with bacilli, it is worse than folly to continue to treat it in any private residence, and more especially in the dwellings of the poor. The only proper place for such a case is an isolation ward, for it is such cases which spread the disease broadcast. The lamentable fad of hygienic tuition for such cases is one of the most dangerous heresies of our time. Any one who has observed such cases, and studied how in a hundred ways in family life, or in a crowded workshop working with the same tools as healthy workmen, they can spread the disease in spite of all hygienic teaching, will agree that there is only one thing to be done with them, and that is segregation.

At paragraph 16 on page 10 of this report, no less than six classes of pulmonary tuberculosis cases are given, which illustrates the antiquated character of the report. For purposes of a national campaign there are only two classes of consumptives, namely, those which are at a non-infectious stage, which should be treated at home, by their own doctor, and those which are infectious, which should be promptly and compulsorily removed to an isolation centre (call it what you will), and retained there until no longer infectious. It is scarcely credible that this report of a committee to advise the Government as to the prevention of tuberculosis, does not even make a suggestion as to the more serious infective cases of its fifth and sixth classes.

Ineffectual attempts at curing instead of concerted scientific effort towards prevention, dominate the whole report, the all-important dispensaries, on which the greater part of the national and municipal funds are advised to be expended appear to be scarcely distinguishable from our present failures, called out-patient departments; there are to be offices, general waiting rooms, committee rooms, consulting rooms, and dressing rooms, and it is only in a secondary and casual way that what might have been deemed the most essential thing of all is mentioned, namely, bacteriological examination.

As the Edinburgh system, invented by one of the signatories to the report, is written so largely over the whole document, it would surely be of some interest to collect information as to the rate of decline of death-rate from pulmonary tuberculosis in Edinburgh as compared with similar Scottish cities before and since the introduction of the dispensary system for which so much novelty is claimed. The death-rate curve has been falling everywhere, but if there is anything of great importance in this dispensary idea then the Edinburgh curve should show a break at the period of its introduction from which onward the fall should be more rapid than in similar cities.

Before all this Government and municipal money is spent, can we have the curves, say, for Edinburgh and Aberdeen, plotted alongside each other, from 1860 or 1870 down to the present date? The scale on which these dispensaries are to be provided is laid down at one to every 150,000 to 200,000 of population. On the usual basis as the numbers of phthisical cases in the population, this will correspond to 1,000 cases in actual attendance at each dispensary at any given time, without including any other forms of tuberculosis. Assigning one visit per week for each patient, this means about 140 cases to be seen daily, and this is to be accomplished by one whole-time chief tuberculosis officer, with one or more assistant tuberculosis officers; also the adaptation and equipment of a house for this amount of hospital work (including, one is left to suppose, all the offices mentioned above) is, it is stated, to cost not more than £250. One is left in some doubt as to whether it can be done, even with public money. A similar failure to think out the magnitude of the problem is to be found in every page of this remarkable report. Considerations of space prevent the possibility of dealing with them all, but the calculations on p. 18 as to required facilities for dealing with tuberculous children are ludicrous. After making much of the fact that some provision has been made at present—namely, 180 places in open-air schools for tuberculosis, and 750 places in general open-air schools for the whole country—the report calmly suggests that 250 additional beds are required for phthisical children for the whole country. When it is remembered that there are between seven and eight million school children, and that, according to one of the signatories to this very report, Sir George Newman, 1 per cent. of these children are tuberculous, this means at least 30,000 phthisical children if only one in three affected is set down as a pulmonary case, so that 250 beds seems an absurd want of adequate provision. Perhaps a more striking way of putting the matter is that it means about five beds for the City of Liverpool. For surgical cases of tuberculosis in children 2,000 additional beds are set down for the whole country, a slightly larger, but again utterly inadequate, provision, as even a cursory examination

of reports of school medical officers will convince any one who cares to inquire into the matter.

It is right that our profession should under proper conditions set its skill at the command of the nation, but it should also demand from the scientific point of view the right of criticism and reconstruction of anything purporting to be a national scheme. A careful examination will soon demonstrate the futility of this hotch-potch report, and cause the substitution of something scientific in its stead.—I am, etc.,

Liverpool, August 5th. BENJAMIN MOORE.

THE PANCREATIC TREATMENT OF CANCER.

SIR,—With reference to this—the enzyme or pancreatic treatment of malignant disease—an editorial in your pages of June 15th, 1907, contains these words: "We have not, however, been so fortunate as to find a single case of cure even in the limited sense is which that word is used by surgeons. We should be glad, therefore, to be referred to the authoritative reports in question." This invitation has been accepted by me elsewhere regarding the case first published by Captain F. W. Lambelle, M.D., R.A.M.C., in the *Journal of the Army Medical Corps*, vol. xiv, pp. 316–18, 1910, and afterwards given with the subsequent history by me in *The Enzyme Treatment of Cancer* (1911, pp. 209–11); but, strange and wonderful to say, although full particulars of this case with six photographs were given more than nine months ago, to the present day no single medical man, official cancer researcher, or medical editor has expressed the smallest interest in this instance of undoubted cure. Under the treatment employed by Captain Lambelle, the remains of the tumour, a "round-celled" sarcoma, twice recurrent after surgical operation, sloughed out more than three years ago. To be precise, the greater portions of these remains were lifted out of their bed by means of a pair of ordinary dissecting forceps on July 15th, 1909, the "patient making an excellent recovery." Under date August 16th I have just heard from the patient for the second time within the last twelve months. He describes himself as going on all right and as "in the pink of condition." As elsewhere written, the case is open to the severest investigation, and this has been invited, but, to all appearance, in vain. The world has not changed since the days of Galileo, and still, like a certain Horky (who wrote a book to disprove Galileo's finds, a book which no one now reads), there are many people—an incredible number, in fact—who would rather die themselves than admit the truth.

There is another case of cure which was published still earlier by Dr. Charles C. Scott in the *General Practitioner* of December 21st, 1907, pp. 803–5, and, at all events on January 16th, 1912, the patient was still living and free from malignant disease. The cancerous nature of the tumour in this instance has been doubted, for no other reason that I can find than that the treatment did what it was intended to do. There was a surgical diagnosis of the highest class after an exploratory operation, and, speaking scientifically, I should always prefer to believe such a diagnosis of cancer, especially if confirmed by subsequent proper pancreatic treatment, than any microscopical pathological examination alone.

For the first time in the history of the pancreatic treatment of cancer preparations of optimum strengths, injections of trypsin (1,250 units) and of amylopsin (500 units), which fulfil in every respect the scientific requirements of the treatment, were put on sale in April, 1912, by a celebrated firm of specialists in ferment preparations, but the sole inquiry I have received concerning them in this country was from a relation of a patient suffering from cancer of the liver as to "whether or not the treatment was dangerous to the patient." Of course it was pointed out that it was the tumour, not any possible treatment, which was "dangerous."

Possibly you have forgotten—it is more than five years ago—that the words quoted above from your pages of June, 1907, ever appeared there. But all the evidences for the truth of the case of recurrent sarcoma are in existence; they will bear any test; they cannot be explained away; and, perhaps because these evidences will bear examination, no medical "authority" dare undertake their examination. Presumably this is "medical science" in 1912. But things are moving, and it does not appear likely that the medical profession will have long to wait before witnessing other astounding evidences of the possibilities and potentialities of the new "1912" injections, as I term them.—I am, etc.,

Edinburgh, Aug. 18th. J. BEARD.

TUBERCULIN TREATMENT.

SIR,—The letters which have recently appeared as the outcome of your leading article upon tuberculin treatment in the issue of July 6th have been very interesting. Dr. Edward E. Prest's letter causes me to ask for the hospitality of your columns to add one idea to those which he puts forward with regard to the cure of pulmonary tuberculosis.

Dr. Prest says: "It may be stated without incurring serious opposition that tuberculin used in some cases produces marvellous results." This is undoubtedly true, and the same may be said to be so in many cases subjected to the ordinary sanatorium treatment. Yet many cases derive little or no benefit from either. The question is, Why should this be so?

In a large experience during the past fifteen years I find very many cases of pulmonary tuberculosis which not only derive benefit, but even get quite well under the treatment by allyl sulphide when both the above-mentioned treatments have failed utterly. In your issue of July 13th last (p. 90) you have kindly criticized my little book on the subject.

There are, however, some cases of pulmonary tuberculosis which allyl sulphide also will not benefit, although this drug is a specific in all tuberculous lesions in accessible situations or in those which can be rendered accessible. Thus amputation for tuberculous disease in such situations as the leg, foot, arm, hand, testicle, etc., are altogether unnecessary, as every case gets well under this treatment. Allyl sulphide, although most penetrating to the deeper tissues when locally applied and a most powerful germicide, specially selective in the case of the tubercle bacillus, will not be curative even in a local case which is accessible if there is "shut-away fluid" which protects the bacilli; whereas if one or more sinuses exist and the fluid is flowing, every accessible case is quickly curable. This leads one to think that the pulmonary cases also in which no benefit arises from treatment are most probably those in which there is "shut-away fluid" in the lungs. By "shut-away fluid" I wish to describe stagnant fluid having no exit, and which fluid acts quite differently to flowing fluid, even when very profuse. It seems unreasonable to expect to sterilize the contents of a cavity in the lungs containing stagnant fluid which is shut away and which protects the bacilli from such treatments as already mentioned. I have formed a strong opinion that when the profession attacks the "shut-away fluid" in the treatment of tuberculous diseases it will then hold the key to the successful treatment of all cases of tuberculosis in a reasonable stage.

To further support this idea we must consider the great successes which frequently follow treatment by the formation of artificial pneumothorax; it owes its virtues, I have no doubt, to the fact that the pressure exerted upon the lung expresses the "shut-away fluid" therefrom. A happy combination of these treatments appears to me to be rational.—I am, etc.,

Dublin, Aug. 13th. WM. C. MINCHIN, M.D.

TECHNICAL ASSISTANCE FOR BRANCH SECRETARIES.

SIR,—I desire to point out that very efficient trained medical clerks can be found in the ranks of pensioned N.C.O.'s, R.A.M.C. These men are quite accustomed to all administrative clerical duties and would be of real use to overworked secretaries. As they have pensions their stipends would not be excessive. I should say, further, that there are retired army medical officers, say those retired at twenty years' service, who would make excellent aids to secretaries of larger Branches. The N.C.O. clerks would be heard of by application to the R.A.M.C. Dépôt at Aldershot, and I imagine the Majors R.A.M. Corps, now acting as staff officers in the Territorial Force, would know of comrades willing to be secretaries, or perhaps themselves undertake the work when their appointments ceased

with the Territorial Force. Every administrative question that is likely to arise in civil medical administration has arisen in the past thirty years within the army. I strongly advise all Branch officers to read the Army Medical Regulations as showing official lines of work.—I am, etc.,

GEORGE J. H. EVATT, M.D.,
Surgeon-General (Retired).

Junior United Service Club, London, S.W., Aug. 18th.

Special Correspondence.

PARIS.

Meningitis produced by Infection of Peripheral Nerves.—Bacteriology of Cancrum Oris.—Absence of Blood Platelets in Purpura Haemorrhagica. — Vacuolar Osteitis following Trauma.—Senile Deformity of the Carpus.

DR. LEVADITI has recently reported some experiments in which he injected an emulsion of the tonsils of an ape (*Cynomologus*) affected with infantile paralysis into the median nerve of another ape. Three days afterwards the animal developed paresis of the upper limbs, convulsions, salivation, nystagmus, and deviation of the head. It died on the fifth day from acute menigitis, due to a Gram-positive diplococcus. An emulsion of the brain and spinal cord was injected into the median nerve of another ape, and again meningitis supervened. Dr. Levaditi was able to trace the infection from the nerve to the meninges along the lymphatic spaces of the nerves, and thence across the nerve ganglia and the roots to the meninges.

At a recent meeting of the Medical Society of the Paris Hospitals Dr. Zuber described a "fuso-spirillum" found in three cases of noma (cancrum oris). They were seen in smear preparations and in sections, though cultures were not obtained. The organism was seen in the subcutaneous adipose tissue stained by the Gram process. Dr. Zuber suggested arsenobenzol as a possible remedy. Dr. Guillard said that in his experience the thermocautery and pure carbolic afforded a satisfactory means of checking the disease.

Drs. Le Sourd and Pagnicz have reported to the same society a case of purpura haemorrhagica in which blood platelets were completely absent; the blood clot showed no tendency to contract. Examination by the centrifuge demonstrated the total absence of blood platelets and their reappearance as the patient's condition improved. Normal clotting was obtained by adding blood platelets of a healthy individual to the purpuric patient's blood, thus, as the authors hold, demonstrating the part played by blood platelets in coagulation.

M. Mauclaire recently reported to the Surgical Society a case of vacuolar osteitis in a man aged 23, who received a blow on the tibia. Swelling occurred at the seat of injury, but the patient was able to walk about until suddenly one day, in the street, the bone snapped about the middle of the diaphysis. The treatment used was that for a simple fracture, and complete recovery resulted with good union. There was no history of syphilis, nor was there any suspicion of its existence. Tuberculous disease was also absent. Mauclaire has collected a series of 80 cases of this kind designated under different names, such as osseous cysts, bone swelling, and vacuolar osteitis.

Professor Marie and Dr. Léri have described a deformity of the hand in old people which they believe to have been hitherto unrecorded. It consists in a protuberance on the dorsal surface at the bases of the second and third metacarpal bones and of the os magnum, trapezoid, and trapezius. In the Salpêtrière Hospital Professor Marie has noted this deformity to be marked in 4 per cent. and noticeable in 12.5 per cent. of people over 70 years of age. The authors believe it to be due to chronic rheumatic nodules.

DR. WILLIAM GRANT of Blantyre was recently presented with a purse of sovereigns and a silver epergne, with a gold bangle for Mrs. Grant, in recognition of his services to the cause of education in the county of Lanark. He was a member of the Blantyre School Board from 1876 until last year, when he retired, and for fourteen years was its chairman.

Obituary.

C. E. HUTT, M.R.C.S., L.R.C.P.,

LATE CHAIRMAN OF THE NORTH MIDDLESEX DIVISION, BRITISH MEDICAL ASSOCIATION.

CHARLES EDWARD HUTT, M.R.C.S., L.R.C.P., who died on August 13th, aged 47, at Tottenham, was a son of the late Canon Hutt, of Hockwold-Wilton, Norfolk. He was educated at Haileybury and St. Bartholomew's, obtained his diplomas in 1888, and became Resident Medical Officer at Hertford Infirmary. In 1896 he commenced practice in Tottenham. He was one of the founders of the North-East London Clinical Society, and had served the offices of Secretary and President. He was Chairman of the North Middlesex Division, 1905.

To a past generation of Rugby footballers he was well known as a "Bart.'s" and Blackheath three-quarter. He also represented his hospital in the Quarter Mile and 220 Yards at the United Hospital Sports.

His greatest claim to recognition is the enormous amount of work he did for the Association. He was Chairman of Division in 1905, a member of the Metropolitan Branch Council, and a member of the executive of the Division for eight years.

It has been said that to know Hutt was to love him. The writer, who had the privilege of being intimately associated with him in medico-political work for ten years, realizes how very true that is. Whatever he did he did with an earnestness of purpose that was the admiration of all, and an example to all of what may be accomplished in a Division by continuous and unostentatious work; for Hutt never advertised himself. Many men with great names in the Association have not done half the work that he has. The present standing of the North Middlesex Division is due in a very great measure to him, his advice being always sought in important crises, of which lately there have been many.

He was always cheerful, always ready to do anything, to dare anything, if a brother practitioner might be helped thereby. Most practitioners in North Middlesex will remember specific instances of this quality of his. His is a loss that is felt by every one in the Division, and the sympathy of all is very deep and sincere for his wife and family.

J. R. FULLER,
Senior Representative, North Middlesex Division.

JOHN RAND, F.R.C.S.,

FORMERLY OF DULWICH.

IT is with much regret that we have to record the death of Mr. John Rand., F.R.C.S., at his residence at Surbiton, on August 7th, aged 76, after a somewhat prolonged and distressing illness due to renal disease and ailments incidental to his age. John Rand was born at Layham, Suffolk, on March 7th, 1836. He was educated at Wickham Market and Ipswich Schools, and on leaving school became apprentice to Mr. Hare, of Great Baddon, with whom he remained two years; he then entered Guy's Hospital, and took the diploma of M.R.C.S., and L.S.A. in 1858. In 1859 he was House-Surgeon to Mr. Hilton, and House-Physician to Dr. Addison. He went with the Comte de Paris to Paris, and studied at the hospitals there. He used to describe in a graphic manner how the tonsil guillotine was there rather dramatically used by its inventor. His contemporaries said that John Rand had many views on surgery in advance of his times, and would have made a name in surgery if circumstances had allowed him to devote himself to it. He first settled and practised at Walton-on-the-Naze and Felixstowe, where he took over the practice of Dr. Grimwood. While there he was an ardent volunteer, being a good rifle shot. He married in May, 1860, Miss Fanny Hicks, of Great Holland Hall, Essex, by whom he had three sons, and one daughter.

In 1868 he was attacked by double pleurisy, and on his recovery the late Sir William Gull advised him to give up country practice; during his convalescence he worked for, and took the diploma of F.R.C.S.Eng. (1869). In this year he joined Mr. E. Reynolds Ray, of Dulwich, and was his partner for fourteen years. Afterwards he continued

to practise in Dulwich, and had Dr. G. B. Batten as partner from 1887 until his retirement nine years later.

The great esteem in which John Rand was held by his friends and patients was shown by the presentation to him of his portrait. As an instance of his kindly influence we may quote what one of his patients then said, "On many occasions his cheerful countenance had been sufficient to dissipate the idea of illness at all." John Rand was equally esteemed by his medical contemporaries in the neighbourhood; he was a much beloved and most genial member of the Sydenham District Medical Society, of which he was twice president. He was a good speaker and his ready and good-natured wit made him a favourite at all meetings. His quiet, courteous manner endeared him to a very large circle. Professionally he was most level-headed and reliable, and his opinion was constantly sought in consultation by other practitioners. He was conservative, and not quick to take up new methods or drugs, but when convinced of their value he used them with thoroughness. In 1886 he helped to start, though he was never a medical officer of it, the East Dulwich Provident Dispensary, which is now one of the best managed, largest, and most useful of such dispensaries in the United Kingdom. He acted for two years as the first Representative of the Norwood Division of the British Medical Association. After his retirement he went with his wife on a trip to India to visit his son, who was in the next year so sadly murdered at Poona on the night of Queen Victoria's Jubilee. While in India he took up golf, which he played with much zest until within eighteen months of his death. He lived, after he retired, first at Raynes Park and then at Surbiton, at which latter place he did much useful work as one of the governing committee of the cottage hospital. He was buried in the beautiful churchyard of St. Mary, Long Ditton, on August 10th. Both his partners testify that they never had a cross word, or even a hint of trouble from their dear partner, John Rand, and no obituary notice can give any idea of the charm of manner, kindliness of spirit, and absolute dependableness which made "honest John Rand" so beloved of his patients and brethren, who now sympathize sincerely with his widow and family.

T. F. GARDNER, M.D.DURH., M.R.C.P.LOND.,

PHYSICIAN TO THE ROYAL VICTORIA AND WEST HANTS HOSPITAL, BOURNEMOUTH.

DR. T. FRED. GARDNER, of Bournemouth, died on August 1st of cerebral haemorrhage, after only a few hours' illness. He had just recently returned home after a holiday in the Engadine, and his sudden death comes as a great shock not only to his sorrowing family, but to a large circle of friends and patients by whom he was much esteemed. He has been cut off in the prime of his days, and has been removed from a busy and strenuous professional life. He received his medical education at University College, London, and took the diplomas of L.R.C.P., M.R.C.S., L.S.A. in 1883. He became a member of the Royal College of Physicians in 1899, and graduated M.D.Durham in 1902.

He went to Bournemouth nearly thirty years ago as resident medical officer to the small hospital which then existed. On giving up that appointment he settled in the town, and speedily built up an extensive practice. His patients were very devoted to him, and relied implicitly on his skill and knowledge. He had a very bright and cheery manner, which enabled him to win his way to the hearts of those under his care, and behind this there was great diagnostic skill and a wide acquaintance with therapeutic methods. He kept himself thoroughly abreast of the times, and was well versed in the newest lines of treatment.

Having for some years acted as Surgeon on the staff of the Royal Victoria Hospital, the institution which had grown out of the Cottage Hospital, and of which he had been Resident Medical Officer, he resigned that appointment, and turned his attention to medical work. He was then offered the post of Physician to the Royal Boscombe and West Hants Hospital, an institution which had been developing in the eastern part of the town, where he lived, and where a large population was springing up. These two hospitals are now amalgamated, and Dr. Gardner took an active part in the negotiations which culminated in the union. Dr. Gardner was a member of the British Medical Association, and had been President of the Dorset and West Hants Branch. He had also served the office of President of the Bournemouth Medical Society, and of the Balneological and Climatological Section of the Royal Society of Medicine.

In the midst of his busy professional life there was little opportunity for his taking part in other work, but he was a devoted member of the church of St. John's, Boscombe, and gave up a considerable part of his time for some years to duties in connexion with that parish.

His death will be deeply regretted by all members of the profession in the town, and the most sincere sympathy is felt for his family in their sudden bereavement. He leaves a widow, a son—now a medical student—and a daughter to mourn his loss.

J. J. CHARLES, M.D., D.Sc.,

FORMERLY PROFESSOR OF ANATOMY AND PHYSIOLOGY, QUEEN'S COLLEGE, CORK.

THE death occurred at Portrush on August 10th of Professor John James Charles. He was born in 1845, the eldest son of the late Dr. David H. Charles, J.P., of Cookstown. He entered Queen's College, Belfast, and there began a collegiate course of remarkable distinction. A scholar of his college, he gained two first honours, and was awarded two gold medals in the B.A. examination of the Queen's University of Ireland, and achieved a similar success when he obtained the degree of Master of Arts. His professional course was also a brilliant one, and he became a Doctor of Medicine in 1865. After working in University College, London, Edinburgh University (where for a period he was Assistant Lecturer on Natural Science), Paris, Bonn, and Berlin, he was in 1869 appointed Demonstrator of and Lecturer in Anatomy at the Queen's College, Belfast. In 1875 he was appointed to the Chair of Anatomy and Physiology in Queen's College, Cork, a position which he filled with distinction until his retirement in 1907. In 1882 the degree of Doctor of Science was bestowed upon him by the Queen's University. Professor Charles acted for a considerable time as Examiner in Physiology for the old Royal University of Ireland, of which he was a Fellow. He was also a Fellow of the Royal Society of Edinburgh.

At the Annual Meeting of the British Medical Association at Portsmouth in 1899 he was President of the Section of Anatomy and Physiology, and delivered an interesting and comprehensive address on recent advances in physiology. He contributed also papers on various physiological subjects to the *Journal of Anatomy and Physiology*.

JOHN WADE, D.Sc., F.I.C., F.C.S.,

READER IN CHEMISTRY, UNIVERSITY OF LONDON; LECTURER ON CHEMISTRY TO GUY'S HOSPITAL.

WE regret to learn of the death of Dr. John Wade, which took place at the Cottage Hospital, Sevenoaks, on August 15th last. He had been out cycling in the neighbourhood of Otford, and in rounding a corner of a lane came in contact with a cart approaching in the opposite direction; the shaft of the cart struck him violently in the left chest, fracturing four of the upper ribs. He was removed to Sevenoaks, and after the first week gave good promise of recovery; pneumonia supervened, the crisis passed, and he was already promising recovery, when he suddenly died of pulmonary embolism.

John Wade was born at Deptford in 1864; on leaving Ashe's School, Hatcham, he worked as Laboratory Assistant at Guy's Hospital to the late Sir Thomas Stevenson. Later he was appointed Demonstrator of Chemistry, and, on the retirement of Mr. Groves, became Lecturer in that science, taking the degree of D.Sc.Lond. in 1902. His contributions to the *Transactions* of the Chemical Society were many, and included: The constitution of the metallic cyanides as deducted from synthetic interactions; The constitution of hydrogen cyanide (1902); Ethyl ether; The influence of water and alcohol on its boiling point (with H. Finnemore, B.Sc.—1909); Influence of water on the boiling point of ethyl alcohol at pressures above and below atmospheric pressure (with R. W. Merriman, M.A.—1911); Apparatus for the maintenance of constant pressures above and below the atmospheric pressure; Applicature of fractional distillation (with R. W. Merriman, M.A.—1911);

The correction of the specific gravity of liquids for the buoyancy of air (with R. W. Merriman, M.A.—1909). His research on the destruction of rodents and ship disinfection was published in a report of the Local Government Board. His book, *Introduction to Organic Chemistry*, passed through many editions, and was translated into foreign languages.

Though largely occupied in teaching and research, Dr. Wade took a keen interest in the affairs of the University of London, and, as a member of the Senate, he will be greatly missed. He was a keen champion of the external side of the university, and pointed out to the Royal Commission on University Teaching in London how, without the facilities offered by the external side, he would never have been able to attain the position he held in the scientific world. He was strongly opposed to the project of concentrating preliminary science teaching at South Kensington, and the abandonment of that scheme was largely owing to his influence; he maintained that the local teaching of science subjects at the medical schools was to their material advantage, and was not, as they had presupposed, carried on at a pecuniary loss. He, too, was strongly of the opinion that science subjects are best taught to small classes under direct personal supervision rather than in a great institution such as the one then projected.

We would offer his widow, his family, and his numerous friends our sincere condolence. His teaching will be a great loss to Guy's, and both staff and students will lament the loss of his able, genial, and kindly personality.

Universities and Colleges.

UNIVERSITY OF LONDON.

THE following candidate has been approved at the examination indicated:

M.S. (*Branch I, Surgery*).—John Philip Buckley, University of Cambridge, and Victoria University of Manchester.

UNIVERSITY OF ABERDEEN.

Gilchrist Bequest.

DR. ALFRED GILCHRIST bequeathed his estate, subject to his widow's interest, to the University Court for the establishment of two bursaries, one in arts, and the other in medicine, and two endowed lectures to be given free to the general public, the one on the progress and present aspects of medical science by the Professor of Materia Medica, and the other on the progress and present aspects of educational science, by the Lecturer on Education.

Medico-Legal.

MEDICAL ETIQUETTE.

AT the last Bedford Assizes was tried an action for libel and slander involving several points of medical interest. Both the plaintiff and defendant were medical practitioners, and the alleged offences consisted in a communication by the defendant to one of the plaintiff's patients of the contents of a letter which the defendant had sent to the plaintiff concerning the supersession in the case of the former by the latter. It was held that the words used in making the communication amounted to a statement that, in consequence of the plaintiff's conduct, his colleagues would refuse to meet him, and that as such allegation constituted an attack upon him in respect of his occupation, it justified, unless well founded, more than nominal damages. The plaintiff, who was represented by counsel instructed by Messrs. le Brasseur and Oakley on behalf of the London and Counties Medical Protection Society, was awarded £50 damages and costs.

The case turned largely on what is the accepted rule of conduct for a practitioner who finds himself in attendance, either in an emergency or at the beginning of a new illness, on a patient whose name is on the books of another practitioner in the same locality. On behalf of the plaintiff, it was argued that the rule is for the superseding practitioner, so soon as the immediate need for his services are over, to suggest to the patient his retirement in favour of the former medical attendant, but that if the patient requests him to remain in charge, he is at liberty to do so and need take no further step in the matter. On behalf of the defendant, it was urged that, though a medical man is at liberty to attend upon the patient of another practitioner if the patient definitely asks him to do so, it is the duty of such medical practitioner not only to suggest retiring as soon as an emergency is over, but also, if this course is declined, to write a note explaining the circumstances to the superseded practitioner.

The evidence in favour of the plaintiff's view included that of Dr. Major Greenwood, while the contrary view was supported by Dr. Bateman.

In the course of his summing-up, Lord Coleridge pointed out to the special jury the value to the public of professional etiquette in the present and other connexions, but said there must always be border-line cases, and no hard-and-fast rule could well be laid down. If, for instance, a medical man had not been in actual attendance on a given patient for, say, five years, there could be no occasion for the new medical man to communicate with the old one. If, however, the old one had been in attendance, say, five days previously, it was clearly the duty of the new one to communicate with him. The witnesses had left it uncertain what was the common view of the medical profession, and possibly the jury would consider that the plaintiff should have made the communication in the present instance, but infraction of a rule of etiquette or acting on an erroneous view thereof could hardly in itself be held to entitle a person to say that the erring practitioner was not a gentleman and that other medical men in the town would not associate with him.

The jury eventually gave the verdict already mentioned.

INSURANCE ACT.

Prosecution of Employer.

THE first case in which an employer has been prosecuted for failing to comply with the provisions of the Insurance Act in regard to the contributions to be paid by the employer was heard at the Lambeth Police Courts on August 20th. The defendant was Mr. Hurlock, draper and clothier of Walworth Road, Vice-President of the Walworth Liberal and Radical Association, and formerly Mayor of St. Albans, where he resides. He was defended by the Insurance Tax Resistance Society which had instructed Mr. Jellicoe. Mr. Travers Humphreys, who conducted the prosecution which was instituted by the Insurance Commissioners, said that if by reason of the failure of employers to pay their proper contributions the insurance fund did not reach the expected standard, the result might be that insured persons might receive lower benefits than they otherwise would. No person was entitled to sickness benefit until twenty-six contributions had been paid and the defendant's failure to pay his contributions had the effect of keeping his employees out of benefit for a longer period than would otherwise be the case. If the refusal continued over a year the insured person would only be entitled to a reduced rate of benefit. Under Section 69, the penalty for each offence was a fine not exceeding £10. The summonses were in respect of three persons and were in identical form.

An inspector appointed by the National Insurance Commissioners stated, in evidence, that on August 1st he had called at Mr. Hurlock's premises, and had been shown eighty insurance cards, none of which were stamped.

The defence was, in the main, that liability on the part of the contributor did not arise until the insurer (the Crown) had performed all conditions which the Insurance Commissioners ought to perform properly to administer the Act. The Commissioners had not fixed any time for the payment of contributions, yet it was urged against the defendant that the contributions become payable on every weekly pay day after July 15th. Substantially, no provision for sanatorium or medical benefit had been made at the time the information was laid, and it could not have been the intention of the legislature to make non-payment weekly an offence, whether the insurer was able to provide medical and sanatorium benefit or not.

Mr. Lawrence George Brock, Under Secretary to the Insurance Commissioners, who was subpœnaed by the defence, stated that the regulations governing medical benefit only existed in a draft form. He could not give a definite date for their issue, but it would probably be in the third or fourth week in September. Neither could he produce regulations as to sanatorium benefit, because none had been made.

The magistrate, in giving his decision, said that he had not to decide whether or not the Government or the Insurance Commissioners had or had not made arrangements for administering the benefits under the Act: the point he had to decide was whether the contributions had been made as they ought to have been made. They had not been made, not owing to inadvertence, but because it was deliberately intended not to carry out the intentions of the Act. He imposed a penalty of £5 upon each of the three summonses, with £5 5s. costs on the first, and made an order for the payment of the contributions. In reply to a request to state a case for the High Court, the magistrate said that if an application were made in writing he would consider it.

The Services.

MEDICAL MOBILIZATION STORES IN INDIA.

THE Government of India has sanctioned the scheme for the formation of a central store in each of the nine divisions, in which will be stored all the field hospital equipment, field medical store dépôts, and the medical stores of general hospitals allotted to the division.

Medical News.

Dr. Sidney Matthews, public vaccinator for the Crawley District, has received the Government grant for successful vaccination.

The portrait of Guybert, published on August 17th in illustration of the article on the Charitable Physitian, was reproduced, by permission, from a print in the possession of the Royal College of Physicians of London.

The International League for the Study of Epilepsy will meet at Zurich on September 6th and 7th. The first meeting will take place at 9 a.m. on September 6th in the Swiss Institute for Epileptics.

The Local Government Boards in England and Ireland have issued orders adding acute poliomyelitis and cerebro-spinal fever to the diseases which must in all cases be notified under the provisions of the Notification Act.

A congress on the care of infants, organized by the German Society for the Protection of Infants, is to be held in Darmstadt from September 20th to 22nd. Among the subjects to be discussed are the education of infants' nurses and the instruction which should be given in girls' schools in relation to the care of infants.

It was stated last week that at the Third International Congress on Industrial Accidents held recently at Düsseldorf Dr. James R. Kerr was appointed a member of the International Committee. It ought to have been added that Dr. F. Shufflebotham of Newcastle-under-Lyme was also elected to be a member of that committee.

Messrs. Thomas Cook and Son have arranged to conduct a party to Berlin to attend the sixth International Congress of Obstetrics and Gynaecology. The party will leave London on Saturday evening, September 7th, and will arrive in Berlin on the afternoon of the following day, in time for the opening meeting of the Congress on September 9th. The party will leave Berlin on the return journey to London on September 14th. The fare of 11 guineas includes second class travelling to and from Berlin and hotel accommodation there.

The inaugural meeting of the newly-formed Section of Ophthalmology of the Royal Society of Medicine will be held on Wednesday, October 23rd, at 8.30 p.m. All registered medical practitioners are eligible as members of this section. The council of the society has resolved to offer special terms to new members of this section who also become fellows of the society. These terms can be obtained on application to the secretary of the society. Only those whose applications for either fellowship or membership have been received on or before October 5th and have been accepted by the councils of the section and of the society will be qualified to take part in the inaugural meeting.

Owing to the munificence of a private donor a school for research and clinical instruction in diseases of the chest has been established in connexion with the Royal Hospital for Diseases of the Chest, City Road, London. The new building of the hospital is equipped with pathological and bacteriological laboratories, a radiographic department, and lecture room, and provided with modern apparatus. An introductory lecture will be given about the middle of October, and it is intended to issue a full syllabus towards the end of September. Arrangements are being made for demonstrations in recent methods of diagnosis and treatment, including the administration of tuberculin. Further information can be obtained from the Acting Dean, Dr. Barty King, Royal Hospital for Diseases of the Chest, City Road, London, E.C.

Since it has been shown that beri-beri is produced by the continuous consumption of white polished rice and not by the older-fashioned hand-milled rice, many attempts have been made to determine the nature of the substance removed from rice by the process of steam milling which produces the polished grain. In a paper in the last number of the *Annals of Tropical Medicine and Parasitology*, Edie, Evans, B. Moore, Simpson, and Webster, after reviewing briefly the literature of the subject and directing special attention to Funk's isolation from rice meal of a crystalline nitrate of an organic base, which was active in reviving pigeons with polyneuritis produced by feeding on polished rice, go on to relate the promising results of some experiments with yeast. Having found that yeast possessed marked preventive and curative properties, an extract of yeast was prepared, which in minute doses had a very remarkable and very rapid curative effect. The experiments are not complete.

Letters, Notes, and Answers.

Telegraphic Address.—The telegraphic address of the EDITOR of the British Medical Journal is *Aitiology, Westrand, London*. The telegraphic address of the British Medical Journal is *Articulate, Westrand, London*.

Telephone (National):—
2631, Gerrard, EDITOR, BRITISH MEDICAL JOURNAL.
2630, Gerrard, BRITISH MEDICAL ASSOCIATION.
2634, Gerrard, MEDICAL SECRETARY.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* British Medical Journal *are devoted will be found under their respective headings.*

QUERIES.

Salwerkhtimah asks whether the number of sweat glands and hair follicles with which an infant is born increases with the growth of the body.

ANSWERS.

Flypad.—We are informed that the Wilson flypads are made by Mr. Archdale Wilson, Hamilton, Canada.

In reply to "E. P.," who asks for advice in the treatment of an adult suffering from angio-neurotic oedema, "T. M." would suggest a course of ichthyol, 5 to 10 grains thrice daily, in pill.

"H. J. T." suggests the following: Ferri ammon. citratis, gr. x; syr. cascar. sag., ♏ v to ♏ x; ammon. bromide, gr. x; sp. chloroform, ♏ xx; inf. calumb., ʒ j; t.d.s.

In the answer to "L. S." in the Journal of August 3rd, p. 284, as to practice in Canada, the prices of the publications of the General Medical Council given were those of earlier editions. The reference should read: *Digest of the Laws in the British Empire and Foreign Countries for the Prevention of Medical Practice by other than Legally Qualified Persons* (2s. 6d.), and *Report as to the Conditions under which Medical and Dental Practitioners Registered or Legally Qualified in their own Country may Practise Abroad* (fourth edition, price 1s.). Both are published by Spottiswoode and Co.

LETTERS, NOTES, ETC.

The individual who goes about selling sparking plugs at various prices, or some one else who imitates his method, appears now to be working the North of England.

Administrative Measures Consequent on the Compulsory Notification of Phthisis.

In the report published last week of the discussion on this subject in the Section of State Medicine the remarks made by Dr. John Brown (p. 366) were incorrectly reported. The points he desired to make were that, after thirty-four years' experience in Lancashire, he finds: (1) That, as in scarlet fever, small-pox, etc., the type of consumption is far more mild and amenable to treatment. (2) This is due to better housing and better living and greater resistance. (3) Tubercle bacilli are ever present in all our crowded towns, in our milk, food, etc., but less virulent and our resistance is much greater. (4) That we can and do cure cases in the houses of the people. (5) That the house of the consumptive is to be the sanatorium, and for an allowance of 5s. he could for that sum, or even less, get the house, and his committee would pay the extra. In this way the patient would be cured under conditions which would be that under which he earns his food. Also his family would have better conditions for health.

Cyclonier Puncture Remedy.

The Cyclonier puncture remedy has been brought to our notice by Messrs. Christy and Co. (4, Old Swan Lane, London, E.C.). It is a fine grey powder which is poured through the valve of the tyre into the inner tube; a small amount of water is then poured through the valve. The tyre is inflated and the wheel revolved for about a minute. If a puncture has occurred, the solution in the inner tube oozes through the opening and becomes hard, and the puncture is thus repaired. A trial of some weeks appears to prove that a repair thus effected lasts well; further, in a tyre so treated, a subsequent small puncture does not seem to be followed by deflation. The inventors state that the solution does not injure the inner tube, but rather helps to preserve it, and that the effect lasts for two years. The cost of the material sufficient for the two wheels of a bicycle is 2s. 6d.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

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